

AGRICULTURAL RESEARCH INSTITUTE'

PUSA

JOURNAL
OF THE
ROYAL
SOCIETY OF ARTS

VOLUME XCVI

FROM NOVEMBER 21, 1947

TO NOVEMBER 5, 1948

LONDON :
PUBLISHED FOR THE SOCIETY BY G. BELL & SONS, LTD.
YORK HOUSE, PORTUGAL STREET, LINCOLN'S INN FIELDS, W.C.2

1948

PRINTED BY
GEO. BARBER & SON LIMITED
FURNIVAL STREET, HOLBORN, E.C.4
AND
CURSITOR STREET, CHANCERY LANE
LONDON

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No 4755

FRIDAY NOVEMBER 21st 1947

VOL. XCVI

ONE-HUNDRED-AND-NINETY-FOURTH SESSION, 1947-48

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N.B.—For purposes of reference, a list of standing Committees for the year 1947-48 will be found on pp. 19-22 of this issue.

VISIT OF HER ROYAL HIGHNESS THE PRINCESS ELIZABETH



NOVEMBER 5TH, 1947

OPENING OF THE ONE-HUNDRED-AND-NINETY-FOURTH SESSION

WEDNESDAY, NOVEMBER 5TH, 1947

Her Royal Highness The PRINCESS ELIZABETH

President of the Society, in the Chair

The Chairman of the Council, Sir HARRY LINDSAY, in an address of welcome to Her Royal Highness, said:

“May it please Your Royal Highness,

“We, the Council and Fellows of the Royal Society of Arts, tender to our President our loyal and heartfelt greetings on this the first occasion on which Your Royal Highness has honoured the Society’s House with a personal visit. We hope sincerely that this will be the first of many such visits, for we are confident that Your Royal Highness will take a life-long interest in the welfare of the Society and the successful prosecution of its objects.

“Our objects are indeed worthy of support. The Encouragement of Arts, Manufactures and Commerce was the phrase chosen by our original founders in 1754. It was repeated in the Royal Charter of Incorporation which we received from Queen Victoria just one hundred years ago, in June, 1847; and it has remained our watchword ever since. In the early days of the Society, the encouragement which our predecessors gave to all forms of pioneering work which might contribute to the cultural life of the nation, and of the Overseas Empire, took the form of monetary grants and medals. Later, Exhibitions and Examinations played an important part, as well as the reading and discussion of papers.

“We attribute these developments in large measure to the genius and inspiration of The Prince Albert, Your Royal Highness’s great-great-grandfather, our first Royal President in terms of our charter. It was he who played the leading part in the organisation of the International Exhibition of 1851, of which the profits became the trust-funds of the 1851 Commissioners; and of the Exhibition of Educational Apparatus and Appliances of 1854 (the year of our first centenary), which led to the foundation of the educational exhibits and library of the South Kensington Museum, now the Victoria and Albert Museum. In these and many other ways, Prince Albert took the keenest interest in the work of the Society and devoted most of his time and of his great talents to the furtherance of the principal objects for which the Society exists.

“In commemoration of His Royal Highness’s Presidency, the Albert Medal was instituted by the Society in 1862 and the first medal was presented in 1864 to Sir Rowland Hill by the Prince of Wales, later King Edward VII, who had become President of the Society in 1863, and was later its first Royal Patron. Your Royal Highness’s grandfather, then the Prince of Wales, was elected President of the Society in 1901, and after his accession to the throne as King George V, His Royal Highness The Duke of Connaught became our President and held the office with great distinction during thirty years. His Majesty King George VI, your father, is now our Royal Patron.

"We welcome Your Royal Highness as the inheritor of a great tradition, the fifth of our Royal Presidents to occupy the office since the incorporation of the Society. That tradition has been a most happy inspiration to our predecessors and to ourselves, and we look forward to many years of active and loyal service, under Your Royal Highness's Presidency, in pursuit of the objects which we have so much at heart.

"Finally, we invite our new President to be graciously pleased, at the inauguration of this new Session, to re-open the historic Lecture Hall which had suffered seriously during the war and which is now once more available for meetings in the House of which we are so justly proud".

Her Royal Highness THE PRESIDENT graciously replied:

"Sir Harry Lindsay, Ladies and Gentlemen,

"I am very glad to be here this afternoon to take my place in the Presidential Chair and to inaugurate the 194th Session of the Royal Society of Arts. The Society has a tradition of useful and important work in the highest interests of our country. The initiative it has always shown, and the encouragement it has given, have inspired scientific discoveries and technical inventions which have become famous throughout the world. I am glad to think that, as Sir Harry Lindsay has said, my family has always taken such a close interest in its achievements.

"The objects to which the Royal Society of Arts addresses itself are worthy of all the support we can give. They are numerous and their scope is wide, but I will this afternoon select one for which, in particular, I would enlist your enthusiasm. It is the work of the Society in the field of industrial design. The spacious days are gone. It may well be long years before we can again afford to devote such leisure and energy as did our forefathers to things purely decorative. But we should be defeatist and unimaginative indeed if we concluded that because nearly everything we produce to-day must be severely practical, it must also be without taste or beauty. Therefore, of all the Society's valuable work I do not hesitate to attach the first importance to your encouragement of a high standard in industrial design.

"A nation whose level of good sense in art was once reflected in the furniture of Chippendale and Hepplewhite, and in the domestic architecture of the eighteenth and early nineteenth centuries, cannot rest content with slavish imitations of foreign styles or with a simple faith in the virtue of stream-lining. Great Britain led the world into the industrial revolution. That was no doubt an historic contribution to human progress. But there has also been a legacy of squalor, misery and ugliness, as well as the fall in standards of taste which accompanied mass production. In a sense we have a duty to lead the world in finding the remedy, and if we are destined to live in an austere age it is for us to establish that beauty is as essential to utility as it proverbially is to truth. It is for this reason that I would repeat to you a sentence which The Prince Consort used in addressing this Society—"The Department most likely to prove immediately beneficial to the public would be that which encourages the application of the Fine Arts to our manufactures".

"I cannot this afternoon speak, as I might wish, of the whole range of the Society's activities or of their contributions to art and science, industry and commerce,

education and social welfare. But I am glad to think that, in this splendid Lecture Hall which was so happily saved from complete destruction by enemy bombardment, artists, scientists and philanthropists of the future may make the same notable contribution to progress and to sanity as their predecessors have in the years gone by.

"I thank you all for the welcome you have given me this afternoon, and I assure you that for me it will be as great a pleasure as a duty to second your endeavours in the realisation of the valuable tasks which it is your function to fulfil.

"It is now my pleasant task to declare this Hall once more open."



Her Royal Highness presenting to Mr. James Gardner his R.D.I. Diploma.

HER ROYAL HIGHNESS then presented silver medals and R.D.I. Diplomas to the following:

R.D.I. DIPLOMAS

James Gardner, O.B.E. (Exhibition Design).
Robert Yorke Goodden (General Industrial Design).
Ashley Eldred Havinden (Commercial Art).

Honorary

Professor Steen Eiler Rasmussen (Denmark) (General Industrial Design).
Professor Alvar Aalto (Finland) (General Industrial Design). (Represented by
His Excellency the Finnish Minister).
Professor Walter Gropius was unable to attend to receive his Diploma.

SILVER MEDALS

For Papers read at Ordinary Meetings—

Professor Douglas Hay, M.C., B.Sc., M.I.C.E. (*Cadman Memorial Lecture*)—"British Coal Mining and the Industrial Revolution : with Special Reference to the Life and Work of the late Lord Cadman".

Dr. A. J. Turner, M.A., "Flax Utilisation".

Sir Kenneth Clark, K.C.B. (*Selwyn Brinton Lecture*), "International Gothic and Italian Renaissance Painting".

Sir H. Spencer Jones, M.A., Sc.D., F.R.S. (*Trueman Wood Lecture*), "Modern Astronomical Instruments".

The Right Hon. Oliver Lyttelton, D.S.O., M.C., M.P., "Production".

Sir Harold Hartley, K.C.V.O., C.B.E., M.C., F.R.S., "A Century of Chemistry".

A. H. Ensor, "Finance and the Use of Money".

Dr. L. H. Lampitt (*Sir William Jackson Pope Memorial Lecture*), "Sir William Jackson Pope: His Influence on Scientific Organisation".

Sir Charles Lidbury, "Great Britain in Relation to the World's Trade Situation".

Miss E. Kay Kohler, "Embroidery as an Expression of National Characteristics".

Sir Stephen Tallents, K.C.M.G., C.B., C.B.E. (*Cobb Lecture*), "The Documentary Film".

For a Paper read before the Dominions and Colonies Section—

The Right Hon. Lord Elton, "The Work of the Rhodes Trust".

For Papers read before the India and Burma Section—

Sir Herbert Howard, "The Forests and Forest Resources of India".

Brigadier J. F. Bowerman, C.B.E., "The Frontier Areas of Burma".

Thomas Gray Memorial Trust—

Captain James H. Williams, for obtaining the highest marks in the examinations for the Ministry of Transport Extra Master's Certificate in 1946.

Sir Kenneth Mitchell, K.C.I.E.; Dr. S. Herbert Frankel, M.A., Ph.D., D.Sc. and Professor T. S. Simey, who had been awarded medals for their Papers to the Society, were unable to attend the ceremony.

THE CHAIRMAN OF THE COUNCIL then delivered the following Inaugural Address:

CULTURAL RELATIONS WITHIN THE BRITISH COMMONWEALTH

By SIR HARRY LINDSAY, K.C.I.E., C.B.E.

Chairman of the Council of the Royal Society of Arts

There is perhaps no word in the English language which is so difficult and so open to misconstruction as the word "culture." Its derivation is quite clear. It is linked with the Latin roots *col*—or *cult*—in the sense of a tilling or cultivation of the soil, the rearing of crops and so on. The same root is found in the Latin word *colonus*, meaning a farmer. As Greek emigrants to Asia Minor and other "homes from home" went primarily to occupy and cultivate new lands—to break new soil, as we say—and as, in later days, veterans of the Roman armies were given farmlands in Roumania and other parts of the Roman Empire, so there is a happy connection between culture and colonisation, for colonists take with them not only their own farming methods but also their own standards of civilisation.

Although the root-idea of culture is thus clear, it is in its applications that doubts and difficulties arise. To some people, culture is as broad as civilisation—a national or even international and continental concept, European, Asiatic or African. To others it is narrower—of social or even individualist application. Certainly

the phrase "a man of culture" is personal enough, for it represents a standard of taste and conduct peculiar to the individual and yet shared by him with the best types of his community. The idea of "quality" is thus essential.

By Cultural Relations within the British Commonwealth I mean the give-and-take of cultural concepts and standards between the various national communities constituting the Commonwealth. If it is a real commonwealth of equal communities, freely associated by political and social ties, then the interchange of cultural ideas will be equally free and equally valuable to all the communities concerned. I will return to this point later.

What is important to our problem is to consider and agree upon the means whereby cultural ideals are interchanged. The first means that leap to the mind are, of course, the purest forms of art—the picture, sculpture, architecture—all visual aids to education—the æsthetic and intellectual life of communities in touch with each other. And then we come to the audible but not visual aids, such as music; and to the visual-cum-audible aids such as drama and *par excellence* the film. I say "*par excellence*" because the film is so marvellously adapted by its own inherent technique to "get across" the whole background of national life, of which national culture is the essential expression—social arts and customs, even local scenery, industrial and home life, the very make-up of a nation.

Again, the mastery of scientific knowledge, whether the drive towards perfection in well-known fields or the discovery and exploration of new fields, yields results which are assuredly cultural. And finally, where does literature come in? It stands to reason that a common language is one of the strongest of international ties, if only because it helps to consolidate cultural affinities. Language and culture are so closely associated that similarity of the one almost involves similarity of the other. The British Dominions and ourselves are thus happily linked, and even where differences of language do occur, as in French Canadian and Afrikaans, the standards of culture as between French, South African and British are of common European origin and, therefore, mutually intelligible and interchangeable. Language helps enormously, also, with the film.

As between the Dominions and ourselves, therefore, cultural relations are naturally close, and machinery exists to draw them still closer. Let me give a few concrete examples. One of the best means of getting the cultural story across is the Exhibition. The outstanding examples have been, of recent years, the Empire Exhibition at Wembley in 1924 and again in 1925; the Empire Exhibition at Johannesburg during the winter of 1936-37; that of Glasgow which was held in 1938; and the New Zealand Centennial Exhibition of 1939-40. The Empire Marketing Board, of happy memory, was responsible for many exhibitions, fairs and shopping weeks between 1926 and 1933, the objects being to link Overseas Empire producers with United Kingdom consumers.

Again, the High Commissioners frequently stage at their London headquarters and elsewhere in this country temporary displays of the arts and handicrafts of their respective Dominions. An exhibition of Canadian paintings was held at the Tate Gallery in 1938 under the title "A Century of Canadian Art". At South Africa House the High Commissioner displays cultural exhibits of the Union, besides organising temporary exhibitions such as the successful Exhibition of South African books last February. The Australian High Commissioner frequently

shows new films in the Cinema attached to Australia House, and organises from time to time exhibitions of Australian art—prehistoric, aboriginal or modern—in his Exhibition Hall. The High Commissioner for India organises exhibitions of Indian art at India House—an Art in Industry display in 1945; four exhibitions of paintings, and copies of Ellora sculptures during 1946, besides a concert of Indian and European music; and during 1947, to date, four exhibitions of Indian paintings and one of Indian industries including arts and crafts.

Conversely, the British Council promotes cultural relations with the Dominions. Its policy is to set up offices in their capitals and important cities, where staff of the Council can act as contact and business agents, keeping in touch with local universities and societies, distributing Council films and literature and arranging lecture tours and other Council activities. Thus, the Boyd Neel orchestra played with outstanding success in Australia and New Zealand. The Wakefield Exhibition of water-colours and prints and an exhibition of British Rural Crafts are visiting or will visit both Dominions. John Gielgud's Company has visited Canada, en route to the States, with the help of the Council; and the Council contributed to the cost of Sir Malcolm Sargent's recent tour in South Africa. The British Council have set up an office in Rangoon, and hope soon to establish one in New Delhi and one in Karachi.

Next, one must refer, although there is no time to describe them in any detail, to the efforts of the Empire and allied Societies established, and sometimes long established, in the United Kingdom—the Royal Empire Society, the Victoria League, the Overseas League, the Imperial Relations Trust, the Empire Day Movement, the League of Empire, the British Empire League, the Royal India Society, the East India Association, the Royal Asiatic and Central Asian Societies, the Royal African Society, the International Institute of African Languages and Cultures, and last, but by no means least, the Dominions and Colonies and the India and Burma Sections of the Royal Society of Arts. By means of lectures, art exhibitions, social gatherings and by other methods at their disposal, a knowledge and understanding of the cultural life of the Dominions, including, of course, India, Pakistan and Burma, are successfully conveyed to members and audiences of this country. Two of these Societies, the Royal Asiatic and Royal India Societies, co-operated with the Royal Society of Arts to move the Royal Academy to organise the Exhibition of Indian Art soon to open at Burlington House. A full account of this Exhibition will be given by Mr. Basil Gray in a paper to be read to the Royal Society of Arts during the session now opening. Proposals for a permanent exhibition of Oriental art were formulated by Mr. F. H. Andrews, a member of Council of this Society, in a paper reprinted in "British Commonwealth Objectives", a volume of papers read to the Society during recent years on Empire subjects, many of them of cultural importance.

Of standing exhibitions of the Empire I must naturally quote the galleries of the Imperial Institute. Most museums and art galleries of the world represent local culture in one or other of its outstanding forms. The Imperial Institute is unique in that its galleries, cinema and pavilion are devoted almost exclusively to telling the story of the Overseas Empire. The galleries were originally intended, on their foundation sixty years ago, to display the economic products of the Empire, particularly the raw materials required to be worked up in this country. The

example of the Wembley Exhibition and the influence of the High Commissioners in London, however, inspired radical changes. No longer was it sufficient to show specimens in glass bottles, on shelves, in showcases or leaning against walls, according to their several natures; or to give their technical names and geographical sources and leave it at that. Exhibits began to take on more of a cultural character, and so also did Imperial Institute lectures, films and other visual aids. The demand was all for an insight into the life and customs of the Commonwealth nations overseas.

Up to this point I have concentrated on the cultural relations existing between this country and the Dominions. I now turn to the more difficult problems involved in cultural relations with the Colonial Empire. And here I must revert for a moment to our initial definition of culture and see whether we cannot get down a little more closely to the real thing. The ancient Greek described primitive man as herding together in village or town communities as a part-solution of the struggle for existence ($\pi\epsilon\rho\iota\ \tau\omicron\upsilon\ \zeta\eta\nu$); but as progressing from the primitive town to the organised city-state in order to ensure a higher standard of living ($\pi\epsilon\rho\iota\ \tau\omicron\upsilon\ \epsilon\beta\ \zeta\eta\nu$). You will see at once the difference. It is that between mere "existence" on the one hand and "the good life" on the other. Which are we going to accept as our criterion for culture? Is it to be just "existence" or is it to be "the good life"? I think you will agree with me that the methods employed by man and the success he obtains in living a full life are the real objectives; but we must always qualify these objectives by insisting that the struggle for mere existence is also of deep interest, provided the most is being made of local ways and means—in terms of local foodstuffs, climatic conditions and raw materials and indigenous skill in utilising them.

The problems involved in cultural relations with the Colonial Empire are difficult, because, firstly, the language difficulty is greater, except, of course, in the case of the Atlantic Colonies; secondly, the standards of tropical culture are very different from those of European origin, and from the more ancient and, perhaps, more easily assimilated civilisations of Asia; and thirdly, as I have said, the struggle for mere existence is often so acute that the desire for the good life is more in the background than in the foreground of the picture.

Let me quote concrete examples. The film is an easy and competent way of describing cultural standards, but Africans who are unversed in European ways get little or no benefit from European films, because, for one thing, the speed of the film is too great; and for another, the European way of life is complex and can only be absorbed by sophisticated eyes and brains. The Colonial Film Unit, in Soho Square, has realised this, and its films of English life are taken at a reduced tempo in order to get "across" to the average African.

Again, the African likes daring colours, and he shows immense skill and perfect natural taste in blending them. His idea of perspective is quite different from ours. He likes to visualise a scene—whether of home, market or village life—from an angle of, say, half a right angle above his subject. And, of course, in his own way he is quite right. You can see much more of your objective if you approach it from "half up stage" and you can convey a broader idea of its implications. His natural taste in these matters is, in some respects, more virile and better than ours.

Apart from the work which the Colonial Office carries out in making the life

of the Colonial Empire better known in this country through its Information Officers and through the Press, many of the major Colonies have their own offices in London—the West Indies, Malaya, the East African Dependencies, Malta, Mauritius, Cyprus, Ceylon—and private societies represent the social life of the last five. The officers in charge of these official bureaux take part in exhibitions and fairs in this country and disseminate literature about their respective territories. This is all to the good. By this means, we British folk can learn much about the cultural life of the sixty or so nationalities constituting the Colonial Empire. Moreover, the Empire Societies, whose work for the Dominions has already been described, carry out similar services in the interests of the Dependencies.

The responsibilities of the British Council *vis-à-vis* the Dominions have been mentioned. Of equal importance is the Council's task of making British culture better known in the Colonial Empire, and Colonial culture better known in this country. In a paper read to this Society some five years ago, Sir Angus Gillan described the work of the British Council in both directions. The paper was published in the Society's *Journal*, and was also reprinted in "British Commonwealth Objectives". I will not, therefore, repeat the story but will bring it briefly up to date.

In the Colonial Empire the British Council has organised its own Institutes in Palestine, Cyprus, Malta and Aden. Elsewhere the policy is rather to encourage the formation of local Institutes which will work on their own pattern, suited to local conditions and affording centres for local cultural activities. On these principles a start has been made in Gibraltar, in Singapore, in the West Indies, in the four West African Colonies and in East Africa. Similar work will follow in the Malayan Union, Sarawak and Hong Kong.

Thus far I have tended to concentrate on the more æsthetic aspects of culture. I now turn to the domain of science. Science is concerned not so much with artistic perception whereby the quality of the good life may be appraised and appreciated, as with the knowledge of practical things in the world around us, and with our adaptations of natural phenomena to our own practical purposes. Art serves in many ways to reflect and emphasise differences of taste and of artistic sensitiveness as between nations and communities, whereas the tendency of Science is to unite. For scientific knowledge lies in the domain of the proved and the probable, and therefore earns universal acceptance by minds tuned in educationally to receive it.

In turning therefore from æsthetic standards to the question of scientific collaboration within the Commonwealth, I am discussing a subject which is more susceptible to organisation and which yields more easily definable results. As everybody knows, the control of scientific research in this country is centred in the Lord President of the Council, the main executive bodies being the Department of Scientific and Industrial Research, the Medical Research Council and the Agricultural Research Council. These originate research and disseminate the results so as to facilitate their development and application to industry. But they do much more, for they maintain close and cordial relations with the similar organisations established in the Dominions overseas; and these relations have, during the last quarter-century, been drawn still closer as a result partly of the interchange of scientific knowledge stimulated by both world wars, and, quite recently, of the discussions

and recommendations of the two Commonwealth Scientific Conferences held in London during June and July, 1946.

The practice of appointing Scientific Liaison Officers to the High Commissioners for the Dominions in London has been accepted by all the Dominions and is clearly a step in the right direction. Two papers incorporated in "British Commonwealth Objectives" illustrate these developments—one, "Scientific Aspects of Australia's Industrial Development", by G. B. Gresford, Australian Scientific Research Liaison Officer, and the other "Scientific Collaboration between the United Kingdom and New Zealand in War and Peace", by A. L. Poole and I. E. Coop, Scientific Liaison Officers for New Zealand. Dr. Malloch, Chief Scientific Liaison Officer for Canada, will soon be reading us a paper, on 18th November, on "Scientific Research in Canada and its Links with Science in the United Kingdom". Doubtless similar officers will before long be appointed to the offices of the United Kingdom High Commissioners in the Overseas Empire.

The work of the Empire Marketing Board, of the Imperial Agricultural Bureaux, the Imperial Economic Committee, the Imperial Institutes of Entomology and Mycology, the Imperial Forestry Committee and of the Imperial Conferences, including that on Economic Co-operation and Consultation (1933); of the two Scientific Departments of the Imperial Institute on Plant and Animal Products and Mineral Resources respectively; of the Colonial Research Committee, the Colonial Products Research Council, the Colonial Social Science Research and Medical Research Committees and the Committee for Colonial Agricultural, Animal Health and Forestry Research, not to mention the Colonial Development and Welfare Acts, is too well-known to need recapitulation. The British Medical Research Council, with its overseas contacts, has already been mentioned; and mention must also be made of the London School of Hygiene and Tropical Medicine, with its special emphasis on tropical diseases and their cure, and of the new British Commonwealth Medical Council. Who runs may read. All these organisations of the United Kingdom, together with parallel organisations in the Dominions, India, Pakistan and Burma, Ceylon and the Far East, Central, Eastern, Western Africa and the Caribbean, have served and still serve to tap known sources of scientific and technical knowledge, official and unofficial, and to direct the various streams and runlets towards the great reservoirs of knowledge from which thirsty souls throughout the Commonwealth may drink.

Where we Commonwealth citizens have a great advantage is in the consciousness that throughout the Commonwealth the standard of scientific enterprise and of originating activity, if I may put it so, is not only high; it is constantly rising and challenges comparison with the best that the United States, Russia, the rest of Continental Europe and Asia can produce. Indeed, it is only of quite recent years, alas, that an element of reticence has come to invade a field in which, in earlier days, the pioneer scientist was encouraged to seek recognition in foreign countries. Nowadays, the element of international competition in its worst and most suspicious sense seems to have crept into this field. It may have been the atomic bomb. It may have been an exaggerated nationalism. Whatever the cause, it seems a pity that the discoverer of new light should be compelled also to originate the bushels under which to hide it. Scientists of the British Commonwealth are indeed fortunate that, *inter se*, the same

freedom still exists as it did pre-war, that the rivalry is still friendly and the results still shared.

I have tried to describe first the æsthetic and then the scientific aspects of cultural relationships within the Commonwealth. There is a third field which I must now mention—a field which unites the arts with the sciences—a field so great that I shall not be able even to begin to do it justice, the field of Education.

In the sphere of Commonwealth education pride of place must, of course, be given to the Rhodes Trust, whose work is known to all Empire-lovers and was effectively described by its Secretary, Lord Elton, in a paper read to the Dominions and Colonies Section of this Society last December. It brings scholars of the Commonwealth together in Oxford Colleges and thus helps to establish a give-and-take in cultural ideas. The Empire Marketing Board did much for an exchange of educational ideals throughout the Commonwealth; and the School of Oriental and African Studies works towards the same objective. So does the Imperial Institute, with its Empire lectures for the grant-aided schools of England and Wales. All the Empire Societies are interested to varying degrees in Empire education—the Royal Empire Society, with its magnificent Empire Library, its new Information Bureau and its Empire essay competitions; the Victoria League, through its Colonial Committee, Colonial Bureau and Colonial Students' Hostel; the League of Empire, which arranges the inter-change of teachers between this country and the Dominions; the Institute of Education, with its facilities for Empire study and for the reception of post-graduate students of the Commonwealth; organisations for School Empire Tours, Public School Exploration Tours, and many others—not to mention the parallel organisations in Canada and in the other Dominions.

In the educational as in the spiritual sphere we get right down to the mainsprings of all true culture. Education in its broadest sense, whether of the home, of the school and university, or of the ordinary social intercourse of daily life, is both conservative and liberal in its operations. It not only preserves all that is best of inherited culture but also ensures the contacts and the knowledge necessary to promote, to sift and to retain all that is best in new cultural ideas.

In this connection I cannot refrain from drawing attention to the fact that the objects for which the Royal Society of Arts was originally founded, and which the Society still pursues, have always been essentially cultural in character. Did not William Shipley, a Northampton drawing-master, state in 1753 "Encouragement is much the same to arts and sciences as culture is to vegetables: they always advance and flourish in proportion to the rewards they acquire and the honours they obtain." Later, Shipley went from Northampton to London and succeeded, with ten other friends, in founding on March 22nd, 1754, the Society for the encouragement of arts, manufactures and commerce in Great Britain, now known as the Royal Society of Arts.

Let me give you a very brief summary of the lines on which the Society developed, for they are closely relevant to the subject of this paper. From the beginning it interested itself in the Arts, both fine and industrial; and the methods employed were monetary rewards or medals, supplemented by exhibitions, leading to the foundation of the Royal Academy in 1768 and to the International Exhibition of 1851. But simultaneously encouragement was given by the same methods to Agriculture,

Afforestation, Industries and Science (under the two main heads of "Mechanics and Manufactures" and "Minerals and Chemistry", leading to the formation of the Chemical Society in 1841). Humanitarian inventions were also encouraged—sanitation and water supply, industrial hygiene, food supplies and life-saving at sea. The promotion of Education has always been a prominent activity of the Society. A system of examinations, held under its auspices, carries with it the award of certificates for proficiency in commerce and modern languages.

The Society has always taken a keen interest in the Overseas Empire and it did much during the first century of its existence to encourage the development of economic products in the Colonies—at first, for example, wine, silk, hemp and potash in the North American Colonies. Then, after the secession of these Colonies, it turned its attention to the West Indies, and in 1794 presented Captain Bligh of H.M.S. *Bounty* and H.M.S. *Providence* with its gold medal in recognition of his romantic introduction of the bread-fruit tree into Jamaica and St. Vincent. Cotton, logwood, cloves and cinnamon were the objects of other awards; and botanical gardens were instituted in islands of the West Indies under the inspiration of the Society. Tea in Assam, a rice-husking machine in Ceylon, hemp in Canada, phormium in New Zealand, wool in Australia, silk in Malta and Mauritius, wine in Cape Colony—all these were the subjects of awards by the Society. Since 1869, the Indian (now the India and Burma) Section of the Society has organised its own meetings for the reading and discussion of papers. An African Section of 1874 is now the Dominions and Colonies Section, with its own papers and discussions.

Examples of still more recent activities have been the inauguration in 1938 of the Faculty of R.D.I.; the formation of the War Memorials Advisory Council, which under the chairmanship of Lord Chatfield advises the Government and local authorities regarding the form of provincial and national war memorials; and the formation of a Committee, with Lord Samuel as Chairman, to explore the best means of celebrating the centenary in four years' time of the International Exhibition of 1851, in the organisation of which, under the Prince Consort's distinguished Presidentship, this Society played a leading part.

I have tried, in this address, to achieve an almost impossible task, to survey the whole field of cultural relationships within the British Commonwealth. Let me conclude by reverting to that essential feature of all successful cultural relationships, which was just mentioned at the beginning of this address: their freedom. I propose in these concluding paragraphs to propound two questions:—"Why is freedom so essential to healthy cultural relationships"? and "Does the British Commonwealth assure to such relationships the right kind of freedom"? They are important and fundamental questions; they are closely inter-connected; and I propose to try and give one answer which shall meet both. In doing so, I shall have to trench a little on Commonwealth history.

The First British Empire started with the Pilgrim Fathers and ended with the secession of the American Colonies. It vindicated certain political and religious liberties of which I will have more to say shortly. The Second British Empire began soon after the demise of the first and vindicated both the freedom of world-trade and the freedom of the seas. Indeed, the expansion of this Second British Empire provided quite new objectives. British trade was extended during the second half

of the nineteenth century not as a world-monopoly but in pursuit of the ideal of free trade for all countries. British sea-power was extended, not to secure *maria clausa* for Britain, but in order that all seas might be free and secure for the flags of all nations.

And so we reach the present, the twentieth, century, when the idea of freedom has been carried further still. The first third of this century saw initiated, worked out and completed, the New Deal for the Dominions. As a matter of fact, Canada had to all intents and purposes become a Dominion in the modern sense as early as 1867. But the turn of the century carried this principle much further; Australia became a Dominion in 1901, New Zealand in 1907, South Africa in 1910, Eire in 1922. Then came the Imperial Conference of 1926 and the famous declaration of the Balfour Committee, defining the Dominions as "autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the Crown and freely associated as members of the British Commonwealth of Nations". This declaration became law in 1931 by the Statute of Westminster, which was accepted and adopted by all the Dominions.

It was at this point that General Smuts, that great philosopher-statesman, once an enemy of Britain and now our best and wisest friend, gave us a lead which escaped notice at the time, but which has since borne valuable fruit. Smuts never liked the word Empire, he always preferred Commonwealth, and in his speech introducing the equivalent of the Statute of Westminster into the Union Parliament of South Africa in 1933, Smuts explained that all Empires of the past had always followed a policy of centralisation. "The British Commonwealth", said Smuts, "has expanded through decentralisation".

What did he mean by that? He meant, surely, that communities living within the British regime are free to live their own lives according to law, and that local laws have always taken account of local conditions and susceptibilities. We do not ask an Indian or an African to become British. We do not seek to impose upon him a rigid British citizenship. We encourage him to be proud of his own nationality and to develop his own life on his own national and natural lines.

These principles accepted and established, we can realise more clearly the great advance in Colonial as distinct from Dominion policy during recent years. I have already described the New Deal for the Dominions, started in 1901, confirmed by the Statute of Westminster in 1931 and culminating in the acceptance of Dominion status by India and Pakistan in 1947. The New Deal for the Colonies may be said to have begun with the passing of the Colonial Development Act of 1929. There followed the Colonial Development and Welfare Acts of 1940 and 1945, and the founding of the Colonial Development Corporation in 1947. I will not trouble you with the details of this legislation. They are known to you. The broad principle involved is quite simple and may be stated as follows. Before 1929 the material and economic advancement of each Colony had depended almost entirely (apart from the sporadic assistance of Imperial loans) on its own material resources. The local revenues were first applied to the costs of the local administration and if there was no surplus left for progressive schemes of social welfare or advanced education, well, that was just too bad.

The policy of *laissez-faire*, which had been good enough in Victorian days, is quite insufficient for the post-Victorian era. It is too rigid. It gives justice but not mercy; and mercy is essential to progress, particularly in the sphere of social welfare. It may be all right for the Dominions which can draw on their own material and moral resources; but it just is not sufficient for the Colonies, of which the most backward are those least endowed with natural resources, material and intellectual, and which, therefore, are most in need of external help. And from what source can that help better come than from the Central Power?

Now let me try and pull together the all too loose threads of this argument. If, as General Smuts said, and I hope you will all agree, the British Commonwealth progresses by decentralisation, this can only mean that increasing weight and value are ascribed to local customs, local art and local administration. All that is best in local culture is freely encouraged. So far as the Dominions are concerned, the process is a natural and healthy one because cultural standards are mutually understood and readily exchanged. In fact, the machinery for such exchange exists and it functions.

So far as concerns the Colonial Empire, we have much to give and much to receive back in exchange. On the scientific side, it is not enough for us to make freely known to our Colonial partners the latest discoveries of science. We must go further and show them how they themselves can apply these discoveries to their own local conditions, whether of human or animal health, agriculture, forestry, mining and the like. On the side of art, there is much that we ourselves may learn from the Colonial nations and they must learn more about us—our manner of life, ways of thinking, all that goes to build up our concept of culture. Freedom is natural to our institutions, and we properly take it for granted. We need nowadays a more constructive appeal than mere freedom. We need mutual knowledge and understanding.

Let me conclude with this suggestion. You will remember the four freedoms which were proclaimed during the war by Churchill and Roosevelt—freedom from fear, freedom from want, freedom of speech and freedom of religion. May I suggest that to these four we should add a fifth—Freedom from Ignorance? If that freedom also were realised, cultural relations within the Commonwealth would draw still closer, based on mutual understanding and goodwill. By this means we may pass on to our successors the great traditions which we have inherited, not merely untarnished, but enriched and ennobled.

At the conclusion of the Chairman's address the formal proceedings terminated.

DESCRIPTIVE NOTE ON THE CEREMONY

The occasion formally reported above was so outstanding that a number of details call for mention, in order to complete the record and for the interest of Fellows who were not fortunate enough to be present at the meeting.

The Society's House was filled to capacity with Fellows anxious to greet their new President. Every seat in the Lecture Hall was occupied and, in addition, over a hundred Fellows were accommodated in an overflow meeting in the Library, which was presided over by Sir Edward Crowe and to which the proceedings were relayed from the room above.

On arrival, The Princess, who was attended by Lady Margaret Egerton and

Mr. John Colville, was greeted by the Chairman of the Council who presented to her in the Entrance Hall, Lady Lindsay, four former Chairmen of Council—Sir Edward Crowe, Sir Atul Chatterjee, Sir Henry McMahon and Mr. J. A. Milne—and the Secretary. Her Royal Highness was then conducted to the dais of the Lecture Hall by the Chairman and Secretary, where she received an enthusiastic welcome from the assembly before taking the Chair. The formal proceedings recorded above then took place.

After their completion, The Princess was conducted to the Council Room where Members of Council were presented together with Mr. O. P. Milne, the architect, and Mr. Robert Goodden, R.D.I. The latter showed to Her Royal Highness the



Her Royal Highness being welcomed on her arrival by Sir Harry Lindsay, the Chairman of the Council.

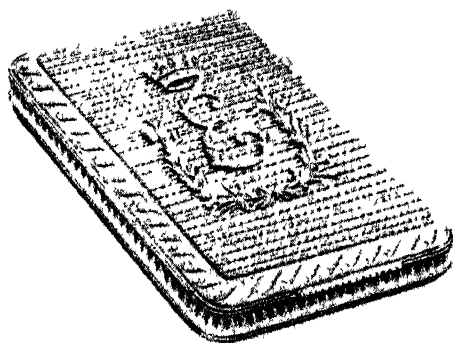
designs which he had prepared at the request of the Council for the present which it is proposed to make to her on the occasion of her forthcoming marriage. The Princess expressed great pleasure at the drawings, which were then shown to the audience in the Lecture Hall by means of the episcopes (the drawings are reproduced on page 17 and will be on view with the other wedding presents at St. James's Palace).

The President then proceeded to the Library where she was conducted by Sir Edward Crowe to see a number of important exhibits illustrating the history of the Society. These included the Minutes of the first meeting, the signature book of the earliest members, the Society's Charter, the original Adam plans for the Society's House, and a complete set of the Society's Medals.

Before her departure, two members of the staff were presented to Her Royal Highness, Mr. A. G. Toye, the Accountant, who is about to retire after 47 years'

service, and Mr. H. T. Broad, the Examinations Officer, who has also served the Society for over 40 years. The same party who had welcomed Her Royal Highness then bade her farewell.

As already mentioned, The President, at the close of her Reply to the Address of Welcome, declared the Lecture Hall open once again for the Society's meetings. This room had been out of commission since the roof and floor were severely damaged by blast from a parachute mine on the night of the 16/17th April, 1941. The work of restoration has been in the hands of Mr. O. P. Milne, F.R.I.B.A., and the opportunity has been taken to introduce several improvements including better ventilation, better lighting, the modernisation of the lecture bench both in appearance and in experimental facilities, and the removal of the projection box to a corner of the room, thereby rendering possible a simplification of the seating



The Design for the Society's present to Her Royal Highness The Princess Elizabeth on the occasion of her wedding. The small box is executed in gold of three different colours and the designer is Mr. Robert Gooden, R.D.I. Its size is about $2\frac{3}{4}$ " \times $3\frac{3}{4}$ " \times $\frac{3}{4}$ ".

plan. Another alteration, due primarily to present-day shortages of materials, is the closing-in of the dome and the introduction of a square recessed light beneath it. The colour scheme is cream above the Barry Paintings and pale green with gold enrichments beneath them. Work on the hall was commenced in November, 1946, and completed only a few hours before the opening ceremony.

The paintings themselves, although they were not in the building when it was damaged, have had their own adventures. They were removed from the walls and rolled a few days before the outbreak of war, and were taken to Buxted Park, the home of Mr. and Mrs. Ionides, to which place the Society's offices were evacuated at the same time. On the night of February 2nd, 1940, the mansion was gutted by fire, and the heavy crates containing the paintings had to be moved out into a snowy

courtyard by squads of soldiers who provided a guard for them until they could be placed once more under cover. A little later they were taken to the National Library of Wales, Aberystwyth, where, with most of the records of the Society, they remained until recently.

The Library has also been repaired within the last few weeks, so that, apart from the upper storey and a few honourable scars remaining in the Entrance Hall and Staircase, the building is now restored to its normal condition.

On the day of the opening ceremony the newly restored beauty of the building was enhanced by most charming floral decorations, devised by Miss Anna Zinkeisen, R.D.I., and by the warm and springlike sun which flooded through the windows.

Since the inaugural meeting was held, the announcement has been made that the President has been invested by His Majesty The King, the Patron of the Society, with the Insignia of the Garter. To their felicitations to Her Royal Highness The Princess Elizabeth on her approaching marriage to Lieutenant Philip Mountbatten, R.N., the Council and Fellows of the Royal Society of Arts now add their loyal and heartfelt congratulations on this dignity so fittingly conferred on Her Royal Highness.

MEETING OF COUNCIL

A meeting of the Council was held on Monday, November 10th, 1947. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Professor E. N. da C. Andrade; Mr. F. H. Andrews; Mr. A. C. Bossom; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Edward Crowe; Sir Thomas Dunlop; Mr. E. W. Goodale; Dr. R. W. Holland; Mr. Basil Ionides; Sir Henry McMahon; Mr. F. A. Mercer; Mr. J. A. Milne; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Captain A. H. Ryley; Sir Frank Smith; Mr. William Will and Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following were duly elected Fellows of the Society:

Adhav, Prabhakar, B.A., Bombay, India.	Jones, Matthew Henry, M.A., Rhyl, Flintshire.
Andrews, George Hugh William Arliss, Hatch End, Middlesex.	Kennedy, Gilbert Young, B.Sc., Rutland.
Anns, Kenneth, London.	Kervick, Francis William Wynn, Indiana, U.S.A.
Bach, Richard Franz, New York, U.S.A.	Lawrence, Henry Michael, M.A., London.
Burrough, Thomas Hedlet Bruce, Bristol.	Marsden, Ernest, C.M.G., C.B.E., M.C., F.R.S., P.R.S.N.Z., New Zealand.
Calvert, Geoffrey Neil, M.A., Washington, U.S.A.	Michels, Walter, Rickmansworth, Herts.
Earle, Lieut.-Colonel Peter Beaumont, M.C., London.	Morrow, Frederick K., O.B.E., Toronto, Canada.
Fisher, Raoul Conrad, Dr. Ing., London.	Nelson, Henry George, London.
Gutowska, Professor Marie Skarzynska, Amherst, U.S.A.	Papworth, Miss Patricia Iris, B.Sc., London.
Harris, Geoffrey, Acomb, York.	Peck, William Peter, Luton, Beds.
Harrison, Geoffrey Bond, O.B.E., B.Sc., Ph.D., Ilford, Essex.	Perry, The Right Hon. Lord, K.B.E., LL.D., Stock, Essex.
Inchbald, Peter Bingham, M.A., London.	

Preston, Professor George Dawson, M.A., sc.D., Dundee.	Southgate, Bernard Alfred, B.A., PH.D., D.Sc., St. Albans, Herts.
Rooksby, Harold Percy, B.Sc., Harrow, Middlesex.	Tett, Hugh Charles, B.Sc., A.R.C.S., Car- shalton, Surrey.
Sandford-Smith, James Maberly, London.	Wise, Percival Arthur, A.R.C.A., Parkstone, Dorset.

The Chairman of Council announced that The Princess Elizabeth had graciously given permission for Her Royal Highness's head to be represented on the obverse of the Society's Silver Medal and that the work of designing new dies for both the obverse and reverse had been undertaken by Mr. Percy Metcalfe, R.D.I.

In accordance with a recommendation of the Library Committee it was decided to take steps for the appointment of a full-time Librarian as a first stage in the intended development of the Society's Library.

It was also decided to apply the income from Lord Bennett's legacy of £2,500 to the foundation of a section of the Library dealing with Overseas subjects.

It was reported that the number of entries for the November Examinations was 15,271 as compared with 5,681 in 1946, the increase being mainly due to entries by Civil Service candidates for the Shorthand and Typewriting Examinations.

A quantity of formal and financial business was transacted.

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Ex-officio members are indicated thus (*)

To save paper, distinctions after the name are given in the first instance only

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J. A. Milne (*Chairman.*).
Sir Frank Brown.

Sir Thomas Dunlop,
K.C.M.G.
Sir Harry Lindsay.*

E. Munro Runtz.*
William Will,*

REPRESENTATIVES OF THE SOCIETY

The following are the present representatives of the Society upon the Governing Bodies and Committees of other organisations:

City and Guilds of London Institute (Council and Executive Committee of the Department of Technology)—Dr. R. W. Holland, nominated by Chairman of Royal Society of Arts Council.

R.I.B.A. Board of Architectural Education—A. C. Bossom.

Architects' Registration Council Board of Architectural Education—Basil Ionides,
F.R.I.B.A.

C.P.R.E. (Council)—J. A. Milne and G. K. Menzies.

C.P.R.E. (Panels Committee)—G. K. Menzies.

Chadwick Trust (Trustees)—E. M. Rich.

London Society (Council)—Lord Broughshane.

Soane Museum (Trustees)—Professor A. E. Richardson, R.A., F.R.I.B.A.

National Film Library of the British Film Institute (Management Committee)—
Sir Harry Lindsay.

Charing Cross Hospital (Life Governor)—Brigadier Sir Edward A. Tandy.

Institute of Physics—Sir Clifford Paterson.

Standards Committee of the Directorate of Post-War Building—F. H. Andrews.

OBITUARY

SIR ALEXANDER MACCORMICK, K.C.M.G., M.D., F.R.C.S.—We regret to announce the death on October 25th, in Jersey, at the age of 91, of the distinguished surgeon, Sir Alexander MacCormick, who had been a Life Fellow of the Society since 1926.

Alexander MacCormick was born in Scotland in 1856. After graduating at Edinburgh University, he went to Australia in 1883, where he soon established a reputation as a surgeon. He served as consulting surgeon with the British Army during the South African War and as consulting surgeon to the British Army in France from 1914-17. His work was sufficiently outstanding to lead to his being given a knighthood in 1913, and being made a K.C.M.G. in 1926.

GENERAL NOTES

EXHIBITION OF CELADON WARES.—A precious assembly of celadon wares, such as is unlikely to be brought together again, has been arranged by the Oriental Ceramic

Society, at 48, Davies Street, W.1, and remains on view until December 20th, Celadon possesses a number of characteristic qualities which appeal to the eye and touch of the connoisseur, but the layman with little or no acquaintance of Chinese ceramics cannot fail to be entranced by the exquisite colour of the glaze, ranging from bluish-green through various shades of green to a deep olive.

The specimens of celadon ware of the Sung dynasty—two dishes, one with a pair of fishes, the other with a dragon and pearl in applied relief (Nos. 24 and 40) are choice examples—have a cloudy green glaze which gives them a resemblance to jade, in contrast to the transparency of the clear glaze of the later Ming celadons. Several discerning collectors, among them Lord and Lady Cunliffe and Sir Alan and Lady Barlow, have contributed to the notable assembly of Ming pieces; and a Ming dish with a crackled green glaze (No. 128), lent by Brigadier and Mrs. Lake, may be named as one of a number of choice examples which deserve special attention.

Some Corean celadons have rightly been included in the exhibition, and the visitor is thus enabled to observe the differences in potting technique and style of decoration between these distinctive wares and those of China. A circular box with a border decoration of flying cranes and petals—possibly used for cosmetics—is a particularly attractive exhibit, with a grey-green glaze characteristic of the Corean wares; and among a number of Japanese celadons (which have also been included as part of the family) mention should be made of a fine kinuta-shaped vase with dragon handles of late period.

Though primarily an exhibition for the connoisseur of ceramics, this lovely display of nearly two hundred pieces should not be missed by those who may be disposed to regard them simply as beautiful ornaments in a room. "As receptacles for fruit on the dining table", remarks Mr. A. L. Hetherington in his foreword to the catalogue, "for the display of flowers or for growing bulbs, and for adding distinction to a room containing old furniture, the celadons have no equal".

N. A. D. WALLIS.

EXHIBITION OF INDIAN ART AT THE ROYAL ACADEMY.—The Exhibition of Art from the Dominions of India and Pakistan which is being held in the Galleries of the Royal Academy from November 29th, 1947, to February 29th, 1948, is the largest and most comprehensive exhibition of the fine arts of India ever seen in Europe.

The Exhibition includes examples of the finest achievements in Indian Sculpture, painting, textiles, illuminated manuscripts, terracotta, metalwork and jewellery, most of them having been loaned specially for this Exhibition from Museums, State Collections and Private Collections in India.

Their Majesties The King and Queen have given their patronage to the Exhibition, which also includes important loans from the Royal collections. The Exhibition has been arranged in co-operation with the British, Indian and Pakistan Governments, and with the assistance of a Committee of experts including representatives of the Royal Society of Arts, Royal Asiatic Society, and the Royal India Society.

The paper to be read to the Society on December 4th by Mr. Basil Gray will be about this Exhibition.

NOTES ON BOOKS

"GAS IN THE NATIONAL PLAN" The Architectural Review No. 604. April, 1947. Price 3s. 6d.

This is the second illustrated Special Number on Power Supplies, produced in collaboration with the Association for Planning and Regional Reconstruction. The first, "Electricity in its Regional Setting", appeared in April, 1945, and dealt with the location of electric power stations and their bearing on architectural design in the development of national life and economy.

The Government have already announced their intention of placing the Gas Industry

under public ownership, alongside coal, electricity, railways, civil aviation and road transport, with possibly iron and steel to follow.

It is stated in the introduction to this Special Number that the aim of the specialists who have contributed the articles is to provide factual information upon which the architect and town planner can depend in tackling the problems connected with gas supplies and those manufacturing processes which result from the by-products of coal carbonisation.

The section which will be of particular interest to the Fellows of the Royal Society of Arts is that written by M. Hartland Thomas, entitled "The Gas Works in the Landscape". It deals with design in the Gas Industry. In the past nearly all gas works have been considered to be an eyesore in any landscape, whether town or country, and the unsightly gas holders have been the special object of dislike. One often felt sorry for the people living near gas works. To-day things have completely changed, and there is no logical reason, says Thomas, why the whole equipment of the gas works, including especially the enormous containers should not be a thing of great beauty and an asset to any landscape. This section describes the attempts now being made to convert gas works and gas holders into positive amenities.

After stating that it is not merely a question of grouping the diverse objects of architecture and engineering with visual discretion, nor an attempt to disguise the large gas holders by camouflage, Hartland Thomas says there are two other elements to be considered. The first he calls "folk art—the public must take a real interest in their gas works and every worker must play his part". And the other is the proper application of functional design, which does not mean, and never has meant, that what is efficient is thereby beautiful, but that it is not enough for an apparatus to work well; it should also look as if it did. Thus, the answer to the problem of the gas works in the landscape is that we can, if we will, make it an adornment to any landscape, given the will, although the aesthetic problem is not an easy one. Illustrations are given to prove that it can be done.

In an appendix the author gives a useful and up-to-date Bibliography, which greatly enhances its value for readers who are in any way connected with the Gas Industry.

This special number of the *Architectural Review* has certainly maintained the high standard which was set by the first, being equally well printed and illustrated. The Editor is to be congratulated on his choice of well-known specialists who contribute the various sections, and on the admirable way in which he has welded the different articles into a consecutive story, so as to present a complete picture of the whole subject. It is of great literary and artistic charm and of definite scientific value, not only to those engaged in the Gas Industry, but also to the general reader.

W. H. CADMAN.

THE PRACTICE OF DESIGN. Edited by Herbert Read, Percy Lund. Humphreys & Co., Ltd. 1947. 25s. nett.

This book opens our prison door and shows us a new world, a world of light clear shapes, precise forms, pure colours and interesting textures. We have the ability to design it; we have the skill and shall, we hope, have the materials to make it; but our minds are not yet attuned to it. We dare not walk through the door. If you don't believe this, ask yourself what reception the extremely interesting designs for schools would have from almost any committee of dons. Look at the newer buildings in Oxford! At best, such a committee would say how interesting such experiments were, how much they liked them personally, but that here—just here—historical background, tradition, canons of good taste . . . Yet, as Mr. Stillman observes, school buildings are an essential part of the educational system and it is true that unless they reflect contemporary thought they are still-born.

One is struck by the inventiveness, sensitivity and curiosity of the designers, by the astonishing developments in materials and techniques, and by the comparatively small impact that this combination has yet had on the things we see around us. Never before in the history of the world has there been a period when real ugliness was normal and

beauty a rare interloper. But, as Mr. Read points out, we must be careful to re-define our conception of beauty in terms of machine production. This won't make us re-grade the horrid welter, but it may lead us to look at strange shapes carefully before condemning them. Unfortunately it is true that many people react at once against any deviation from type, whereas a few gobble up any novelty however grotesque. Some are tolerantly critical of old and new things on their merits. Design for the machine cannot fail to give beauty of a more impersonal kind than is evident in hand craftsmanship.

When reading of Morris's attitude to machines (p. 208) I feel that one should not forget that Morris clearly saw that the machine had been exploited to create a social system which few can approve to-day. He saw that design was a reflection of the pattern of life, and that was a great discovery. That he should feel the machine should be cast out with the system was not unnatural, and, like Mr. Read, I can sympathise, though I feel, too, that we must choose the hard way rather by learning to control it. Its dreadful potentialities in war have been brought home to us, but it can be nearly as deadly in peace, unless it is guided by a social conscience. And here I find the book most encouraging. Writer after writer stresses the importance of the humanistic approach, of not listening to one expert only, be he designer, manufacturer, retailer, advertiser, customer, or what you will. "It is a change of heart we need, not a change of manufacturing methods", says Mr. Read. It is indeed. I know a charming little town which had an old bridge over the Severn. Any evening in summer you could see old and young folk resting their elbows on the bridge, talking to their friends in boats, watching fish and swallows. Growing traffic demanded a new bridge. Engineers designed one most efficiently with sheet-steel sides five feet high! Humanity to them meant just Traffic, something moving. It never occurred to them that to cut the inhabitants off from their river was a most grievous loss. But, in spite of such all-too-common lapses, I think we still do have some respect for the individual. Is this not exactly where we might lead the world? We have an ability to sit round a table and listen with tolerance and often to reconcile widely-varying points of view. Industrial design is such a team job: it needs patience, good humour and skill in negotiation. In America design is linked to advertising which is often anti-social, in Russia it is linked to the state. Can we not place it at the service of the individual?—not necessarily, of course, by way of nationalisation, which would hardly favour the growth of a plant so difficult to regiment.

But surely we cannot return to that narrow, shabby world which thought only of profits. It is first the people and then the goods themselves which count—goods made honestly to serve individuals' real needs. And there is no reason at all why such goods should not earn profits. This book points the way.

I must add that the general lay-out is good and it is easy to read, but I cannot think that a system of binding which is excellent for loose-leaf books is likely to be lasting. Although the pages lie flat, it takes some coaxing to make them do so. To be precise I think this should be called casing rather than binding. And why should the title on the spine not be designed so that one can read it from a distance of a few feet? And why no index? These are small points but from such a source one expects an exceptional standard.

GORDON RUSSELL.

PROGRAMME OF MEETINGS

A List of those Meetings so far arranged for the 194th Session is now ready and can be obtained by Fellows on application.

ADMISSION TO MEETINGS

Fellows and Associates are reminded that, except on special occasions, they are entitled to attend all the Society's meetings without tickets and to bring two friends with them. When they are unable to introduce visitors personally, they are allowed to issue special admission tickets, a book of which will be sent on request.

MEETINGS OF THE SOCIETY DURING THE NEXT FORTNIGHT

ORDINARY MEETINGS

WEDNESDAY, NOVEMBER 26TH, at 2.30 p.m.—(*Selwyn Brinton Lecture*) "ORIGINALITY IN ITALIAN RENAISSANCE ARCHITECTURE". By R. A. Cordingley, M.A., F.R.I.B.A., M.T.P.I., Professor of Architecture, Manchester University. W. H. Ansell, M.C., P.-P.R.I.B.A., in the Chair. (Illustrated by lantern slides.)

WEDNESDAY, DECEMBER 3RD, at 2.30 p.m.—CRAFTSMANSHIP—(ii) "THE CONTEMPORARY STUDIO-POTTER". By Bernard Leach. W. B. Honey, Keeper of the Department of Ceramics, Victoria and Albert Museum, in the Chair. (With illustrations.)

INDIA AND BURMA SECTION

THURSDAY, DECEMBER 4TH, at 2.30 p.m.—(*Joint Meeting with the Royal India Society and the Royal Asiatic Society*) "INDIAN ART—WITH SPECIAL REFERENCE TO THE EXHIBITION AT THE ROYAL ACADEMY". By Basil Gray, M.A., Keeper of Oriental Antiquities, British Museum. Field-Marshal Earl Wavell, P.C., G.C.B., G.C.S.I., G.C.I.E., C.M.G., M.C., in the Chair.

The India and Burma Section are also sponsoring, together with the Royal India Society and the Royal Asiatic Society, the following two public lectures in connection with the Royal Academy Exhibition of Indian Art which will be given in the Lecture Hall of the Royal Society at Burlington House.

WEDNESDAY, DECEMBER 3RD, at 5 p.m.—"PLASTIC COMPOSITION AND PERSPECTIVE IN THE AJANTA FRESCOS". By Miss Jeanne Auboyer, of the Guimet Museum, Paris.

WEDNESDAY, DECEMBER 10TH, at 4 p.m.—"HINDU AND MUSLIM IN INDIAN ARCHITECTURE". By Martin H. Briggs, F.R.I.B.A.

CANTOR LECTURE

MONDAY, NOVEMBER 24TH, at 4.30 p.m.—"EXHIBITION DISPLAY". By James Gardner, O.B.E., R.D.I.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, NOVEMBER 21..Geographical Society, Royal, S.W.7. 8.15 p.m. Surgeon Commander E. W. Bingham, O.B.E., R.N., "Exploration and Survey in British Antarctica."

TUESDAY, NOVEMBER 25..Anthropological Institute, Royal, at the Royal Society, W.1. 5 p.m. W. L. H. Duckworth, "Some Complexities of Human Structure." Architects, Royal Institute of British, W.1. 6 p.m. Dr. Nikolaus Pevsner, "The Picturesque in Architecture."

East India Association, at the Royal Society, W.1. 2.30 p.m. V. K. Krishna Menon, "India." Illuminating Engineering Society, at 2 Savoy Hill, W.C.2. 6 p.m. Professor H. Hartridge, "Recent Advances in the Physiology of Vision."

Textile Institute, at the Memorial Hall, Macclesfield. 8 p.m. E. Cotterill, "Modern Trends in Textile Machinery."

WEDNESDAY, NOVEMBER 26..Kinematograph Society, British, at the Wellcome Foundation, N.W.1. 7.15 p.m. George Pearson, "The Film in Colonial Development."

THURSDAY, NOVEMBER 27..Refrigeration, Institute of, at the Institution of Mechanical Engineers, S.W.1. 5.30 p.m. (1) R. W. Griffin, "Electrical Thermometry and Gas Analysis." (2) C. E. Stratton, "Automatic Expansion Valves."

Textile Institute, at the Technical College, Batley. 7.15 p.m. L. Bellwood, "Colour in Woven Textiles."

TUESDAY, DECEMBER 2..Architects, Royal Institute of British, W.1. 6 p.m. R. Llewelyn Davies, "Choice of Structural Type and its Cladding." Kinematograph Society, British, at 16 St. Mary's Parsonage, Manchester. 10.30 a.m. J. Baggs, "Electronics in Industry." Mechanical Engineers, Institution of, S.W.1. 6 p.m. Lt.-Col. E. G. McEwen, "Recent Developments in Automobile Transmission."

WEDNESDAY, DECEMBER 3..Electrical Engineers, Institution of, W.C.2. 5.30 p.m. T. C. Macnamara, A. B. Howe and P. A. T. Bevan, "The Design and Operation of High-Power Broadcast Transmitter Units with their Outputs Combined in Parallel."

THURSDAY, DECEMBER 4..Chadwick Trust, at St. Mary's Hospital Medical School, W.2. 4.30 p.m. Dr. Gordon B. Mitchell-Heggs, "Some Changes in Dermatology since the time of Sir Malcolm Morris."

Chemical Society, Burlington House, W.1. 7.30 p.m. Sir Ian Heilbron, "Recent Developments in the Vitamin A Field." Town and Country Planning Association, W.C.2. 1.15 p.m. Dr. Charles Hill, "Health and Housing."

FRIDAY, DECEMBER 5..Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. Dr. E. A. Watson, "Fuel and Combustion Systems for the Aero-Gas Turbine."

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MEETINGS OF THE SOCIETY

The following meeting will take place within the next fortnight:—

DOMINIONS AND COLONIES SECTION

TUESDAY, DECEMBER 16TH, at 2.30 p.m.—“AUSTRALIAN ART”. By Colin Colahan. The Right Hon. Viscount Bruce of Melbourne, P.C., C.H., F.R.S., will preside. (The paper will be illustrated.)

CANCELLATION OF MEETING

It has unfortunately been found necessary to cancel the meeting which had been arranged for Wednesday, December 10th, and at which Mr. Michael Graham was to have read a paper on “Science and the Fishing Industry”.

DR. MANN JUVENILE LECTURES

The two customary Juvenile Lectures will be given in January, under the Dr. Mann Trust. The lectures will be suitable for children of twelve years and over. The details are as follows:

WEDNESDAY, DECEMBER 31ST, at 2.30 p.m.—“HOW WE GET OUR COAL”. By F. J. North, D.Sc., F.G.S., Keeper of Geology, National Museum of Wales. (Illustrated by lantern slides and films.)

WEDNESDAY, JANUARY 7TH, at 2.30 p.m.—“WHAT WE CAN DO WITH OUR COAL”. By W. Idris Jones, B.Sc., PH.D., Director-General of Research, National Coal Board. (With demonstrations.)

Refreshments will be provided after both meetings.

Tickets will shortly be available and Fellows are entitled to apply for one for each lecture (admitting one adult and two children). A sufficient number of tickets to fill the room on both occasions will be issued in the order in which applications are received and the issue will then be discontinued. Fellows desiring tickets are therefore advised to apply to the Secretary as soon as possible, stating the number required and the date or dates on which admission is required.

ADMISSION TO MEETINGS

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CRAFTSMANSHIP

(I) THE CRAFTS—THEIR PAST, PRESENT AND FUTURE

By JOHN FARLEIGH, A.R.E.

Second Ordinary Meeting, Wednesday, November 12th, 1947, at 2.30 p.m.

A. E. RICHARDSON, R.A., F.R.I.B.A., *Professor of Architecture, Royal Academy Schools,
in the Chair*

THE CHAIRMAN: My task in welcoming you here to-day is to say as little as possible and leave you to enjoy Mr. Farleigh's paper. However, I think it is due to him to introduce him in the right way. He is a distinguished painter and engraver. He is an Associate of the Royal Society of Painter-Etchers and Engravers, and a member of the London Group as a painter, President of the Arts and Crafts Exhibition Society, Chairman of the Crafts Centre and a famous illustrator. He illustrated Bernard Shaw's book "The Black Girl in Search of God", using black illustrations which were most apposite. This afternoon he will lecture to you using no slides, relying entirely on the spoken word and I can promise you a real intellectual treat.

Mr. FARLEIGH then read the following paper:

Since this lecture is an introduction to a series of talks by craftsmen on their crafts, I am proposing to talk about craftsmanship as a principle and leave it to the subsequent lecturers to give you their practical and specialised points of view.

The title of this talk may have misled you into thinking that I am going to give you an historical survey of the crafts, finishing with an "inspired" glimpse into the future. This is not my intention; neither am I proposing to lighten the load by showing slides. Lest you feel that I am shirking my responsibility let me hasten to explain that I am hoping to talk about craftsmanship as an experience; an experience that is part of life as it has been, is being, and may be lived in the future. And, in so doing, I hope to make it clear that I mean creative craftsmanship, as against ordinary craftsmanship in the commonly accepted sense of the word, however skilled it may be. We call this creative craftsmanship "fine craftsmanship" which means that the object is conceived and made by the craftsman himself. The quality of his work as a creative craftsman stands by his skill both in design and workmanship—neither should outstrip the other if it is to achieve the correct balance, and it should excel in both. Thus we see that it compares, in its own right, to the work of the painter and sculptor, the fine arts and the fine crafts having an equal status. If I can convey all this then you will see that my talk is properly an introduction to the craftsmen who follow.

Is it possible to establish an absolute value in "fine craftsmanship"? I think it is.

I would like you to forget history for the moment and think of the past, present and future, as a simple, continuous movement. This is not easy when we think of thousands of years, but it is possible if we think of a few hours—indeed we are used to thinking of twelve hours which are “to-day” as the present. We can, in the space of one day, watch a craftsman evolving an object from a piece of wood or clay. If we watch with real understanding we will know that as the clay is forming under the potter’s hands a new form is being born in consequence of the creative impulse of the potter who is living for the moment through his hands. Let me remind you once more that I am not talking of the potter who is reproducing a known form, or working to a blue print, which would be an act of imposing an idea on to the clay. It is true that this in itself can be good when the imposed form has been proved a “true” form, and bad only when the imposed form is either mere imitation or the dictates of fashionable stylisation. I am trying to convey to you the craftsman who, with a background of long familiarity with his medium, and an awareness of the tradition of his craft, and a consciousness of the needs of the present, takes a step into the dark and puts his faith into his hands as they feel the possibilities of forms potential to the clay. The craftsman is being guided by his medium as much as he is guiding it.

The time element for production is something that cannot be pre-determined. This is only possible when a machine is working to a pattern, or a workman reproducing a known form in multiple. Though this last may be craftsmanship of a very skilled order it is not creative as is the “fine craftsmanship” we are trying to understand. The creative potter is finding a form out of his material during a certain period and in a particular frame of mind. If his sensibilities are in tune with the present, as they should be, then the form that emerges will reflect that awareness of the present that we recognise as “contemporary”. Something has evolved over that short period of living-while-working. It is the mental and physical impulse in contact with clay or, pushing the idea just a little further, life passing into clay. If the moment is ripe, the form may be born easily and the production period may be short; on the other hand, the process may be difficult and the production period delayed. Whatever the time element may be is beside the point as the true craftsman is not and cannot be concerned with time while he is evolving a new form. This timelessness is the one important condition of all creative work. It need hardly be said that the idea of profit is the least concern of the real craftsman. Again I must remind you that I am talking of the craftsman who is creating new forms, or perhaps more correctly I should say, evolving from one form to another.

This feeling of timelessness, that is so easy to comprehend over a period of a few hours, when it is possible to watch with complete absorption the production of an object, is more difficult when we attempt to embrace a few thousand years. Once in the right frame of mind, however, we find that the past, present and future roll into one. The past is but tradition which has been inherited and is now an instinct, and it is applying itself to the ever-present moment, while the future is always within the grasp of the creative craftsman—he is forever touching it with his tentative fingers. Sometimes this constant reaching out of the hands and mind of the craftsman will grasp something firmly and then a new form will emerge. Even though this new form is but a fraction of something that has been added to thousands of years of

tradition it will appear new in its very essence. Such minute changes have revolutionised theories and practices ever since man began to think beyond the animal—they have brought about the evolution of the steam engine; made flying what it is; given the potter his wheel, and produced the printing-press, a new method of painting a new line to architecture, a new glaze to a pot, a new shape to a chair, a new manuscript hand and a new type.

Always the story is the same—a constant probing that never ceases, a constant procession of new forms. For man lives and while he lives he must give life to everything he does. It is only the machine that is sterile. It cannot invent; it must be supplied with new forms and these new forms will require new machines designed to meet the new needs. When the machine is set to produce a form it can only multiply. Since multiplication is the right and just function of the machine it becomes obvious that we should see to it that the forms it multiplies are good. That they should be forms suitable to the machine is equally obvious.

But true craftsmanship is not a working to a pattern, nor is it concerned with time. And, because it concerns itself no more with the transitory stylishness of the dictates of fashion than it does with archaic forms, it has a quality that is neither the "modern" which must date in a few years, nor the "archaic" which is but a sterile worship of the antique. Timelessness is the quality of all great art. It is the absolute value that I should like to establish and it belongs to the great works of all the creative artists—painters, musicians, architects, sculptors, and I would include craftsmen, for all these activities are so intertwined that they cannot be separated and one does not progress without the others.

Every generation has formulated its own conception of beauty. When we look back we recognise the period by the character of the design. We see how well this design reflects the period in which it was made. That is what I referred to earlier when I said that if the craftsman was in tune with the present and not wilfully living in the past, then his work will have a contemporary quality. Yet, in spite of this period quality, there is something more in great art that enables it to live equally well at any time. It is possible to take the best work of any period and place it side by side in a modern interior. The best things of any period have ultimately no period—they are timeless.

I am fully aware that, up to now, all that I have said can be valid only for great artists and craftsmen and that a list of names of the greatest of these would be a short one. But we must have such standards set by a few men since it enables the greater mass of less gifted craftsmen to maintain a higher standard than would have been possible otherwise. These few great men we must have and we must know how to evaluate their work if we are to excel in our craft.

What have we established so far? That there is a certain recognisable quality in all great craftsmanship that is timeless. One of our important modern philosophers has said that truth is self-evident and cannot be proved. If we try to analyse this quality of timelessness—not in any attempt to prove it, but perhaps to recognise it—we shall find, I think, that beauty of form is the thing that is the most moving and lasting thing; and, on closer examination it will be found that that beauty has emerged rightly from the material that has been used. This would seem to imply that design comes before craftsmanship and I have said earlier that the one should

not exceed the other. I might qualify that statement and say that good design is possible with less good workmanship; but that a bad design cannot be saved by superb craftsmanship. If, however, I chose to be uncompromising in my first statement I would say that really great design grows out of a masterly handling of material, which means a full awareness of the true forms that can be drawn out of a material, and a great skill in making. The fact that we recognise design before craftsmanship is right and proper, and is dependent on emotional factors. The hidden qualities of craftsmanship are the processes leading us directly to the emotional quality of pure form. It is right therefore that form should be the first important factor by which we judge the work of a craftsman just as it is so for painters, sculptors and architects.

The crafts are, with few exceptions, concerned with the problems of pure form and in this sense they are closer to architecture than to the plastic arts which are concerned also with the visual presentation of known forms. A house is useless without furniture, whereas it is just possible to live in it without pictures. The craftsman's work is therefore an integral part of the problem of architecture which shares with great craftsmanship the timelessness which arises out of beauty and rightness of form rather than subject matter. If we are to be great craftsmen, we must develop the ability to recognise beauty of form. As I have inferred, subject matter, since it is less important than form, will lose its significance over a period of time. In the work of the craftsman the quality that we recognise as "contemporary" becomes "period" in the course of time. This period quality is not in itself important for we shall find only in bad design that it is objectionable. Good forms in furniture, glass, etc., however much they reflect the Elizabethan, Georgian or Regency, will live and take their place happily in an architectural setting of the most advanced order. I would be very rash to attempt to define beauty of form. I can only remind you that, like truth, it is self evident; but it may be necessary for us to apply ourselves closely to the study of all forms, good and bad alike, and over a very long period before the good forms emerge as obvious and self-evident. There are the gifted few who have a feeling for form that is as instinctive as the act of breathing—to them I am wasting my words.

Thus far it seems that I have been pre-occupied in establishing a recognisable value in creative craftsmanship which, I must add, is not merely for the benefit of non-craftsmen, for conditions have changed somewhat and we, as craftsmen, need to be reminded occasionally of the proper values. But the chief object of this introduction on values has been to establish something of a permanent nature that could then be related to the past, present and future; and, indeed, to destroy the sense of time that is conjured up by these words. There is an archaistic implication in the word "past" that I do not like and an ephemeral nature in the idea of "present". Neither the archaic nor the ephemeral have anything to do with creative work, and the future, which after all is not ten years ahead, but is in the job of work that we are about to do in the next few hours, is our reason for living. In fact, is it not life itself?

What I am trying to tell you is that the most advanced contemporary work is so close to the original methods that the spirit of the creative artist is almost at one with his early forbears, however remote in time they may be. The hands of man have not changed. There is a limit to the evolution of tools and his heart has changed very

little. However, the fundamental appetites remain, and in these I include the need for spiritual food. Only conditions alter and these, when all is said and done, have changed life very little. Our aspirations have changed very little. We still seek satisfaction in the arts, for science and knowledge have brought very little comfort.

Having spent so much time in telling you that time does not alter the significance of the work of creative artists and craftsmen, I am now able to examine more closely the subtle differences in the artists of the past and the changes in the character of their work. It seems the only way we can do this is to study their actual work in the museums. What they felt and thought we think and feel, as we examine this work and our conjectures to-day must be based on a very brief glimpse.

Go back to the beginnings of any of the arts or crafts and you will find a vitality and excitement that is comparable only to the excitement of the child as life unfolds itself. We shall also find this vitality closely related to utility; in fact both are closely related to a pressing need for the ordinary things of life. It is easy to conjecture that creative work was looked upon naturally as a way of life. A job of work had to be done, but it was a job of work that gave boundless opportunities for man to satisfy his insatiable love of making things and his curiosity, which are very close indeed to the mind of the child. As time passes we find a growing love of power over the materials that are being used, and a discovery that forms can be produced which are satisfying as an expression of man's spirit, whether it be troubled or in a state of exaltation. As in the arts, so in the crafts, increase of skill and maturity combine to produce an expression in work that is a mirror to men's lives, which is the combination of craftsmanship or technical mastery with the creative sensibility of the mind of the artist.

Before the invention of the machine life must have moved very slowly and there must have been a great love of work and a great satisfaction in the hearts of craftsmen. This we can perceive in their work. Forms changed only by a slow process of evolution—some were magnificent, some good, some not so good—but they were never bad, for there was only the craftsman to guide them with a loving hand. He was the master. Even when he worked with a patron, it was with a cultured person whose tastes and standards were based on the work of other craftsmen. The taste of the wealthy patron was reflected downwards to the peasant's cottage, for when a cottage did possess furniture, pots and pans, these were always made by craftsmen who based their work on the master's taste. Again this is evident in the museums. However simple the object—a dresser, a lock or a toasting fork—we find a rich, a full appreciation of the problems of design in craftsmanship. There is indeed, so little back-sliding or conflict in the principles of fine craftsmanship that it is not easy to escape a sensation of nostalgia for the past. We must remind ourselves, however, that it is the unrivalled position of the craftsman that we regret. His was the only method of production in the pre-machine era and it gave him pre-eminence in the direction of design.

It is possible nevertheless under such conditions for a decadence to set in, and this is discernible well before the machine took over. One of the causes of this was, no doubt the increasing demand for goods, for when such pressure is brought to bear the work of the craftsman suffers. I suggest that the machine was the saviour rather than the monster it is usually made out to be. It saved the craftsman from multiple

production just as the camera saved painting from the slough of naturalism. Had the introduction of machinery coincided with a good period in design, I think we should have missed much of the ghastly ugliness of the industrial revolution. Machine production does not mean ugliness—compare the type faces of the first century of printing, with the preceding letter forms of the scribes—but if it is set to produce ugliness, then it is that much more evil than a few handworkers because of its capacity for multiplication. Thus, its virtue becomes a vice. It is a sobering thought that artists and craftsmen are partly responsible for the ugliness of the nineteenth century.

But to hasten to the apparent disaster of the nineteenth century is to understate the case for the early craftsmen. I have referred earlier to the skill and mastery in design of so much of the early work, and to the content that comes with such conscious mastery. This content was by no means smug. There is evidence in their work of subtle changes and evolutions that shows how conscious the craftsmen were of the needs of their time, and there is no doubt that they could be influenced by fashion without loss of virtue. Neither were they lacking in playfulness or “whimsey”. It may seem odd to suggest that they set out sometimes to have some fun with the design of a chair, but we have the evidence to prove that a chair can be both light-hearted and function properly. That they were not content with function is equally evident, for they could embroider a subject to a point where we would not dare, and yet lose none of its bigness and simplicity. What does this love of “going on” imply? Surely that workmanship, when it is creative, is a kind of glorification—a tribute to the idea of life—call it worship of God if you like. However it is defined, the effect of such work on other people is to induce in them a sense of the better way of living, and rightly so because good workmanship is but a realisation of life.

Come what may—whether it be the industrial revolution, or the impact of war—this spirit is not easily destroyed, but the craftsmen themselves can be hampered by restriction, and they can be so reduced in numbers and so dispersed that there is a great risk of the tradition foundering and getting lost. A craft is not learned in a lifetime; it is the inherited skill and knowledge of thousands of years and this must be passed on by an unbroken chain of craftsmen. If this chain were to be broken for even a few years it would mean going back to the beginning of Time. This has never happened in this country, although we have been dangerously near the edge. A sprinkling of craftsmen survived the industrial revolution and held on to the tradition of their crafts with their finger-tips until the intellectual revival of the crafts began with Ruskin. The group of men that followed him, led by Morris, picked up the significance of creative crafts and tried to relate this significance to a right way of life. Intellectuals, artists and writers they may have been, but their way was the only way the crafts could be saved.

Much had to be re-learned, but the great modern movement had begun with this self-conscious effort to discover how un-self-conscious really great craftsmanship is. Another change had taken place by this time. Man was not dependent on the craftsman for his goods and chattels and so these craftsmen were given a much-needed freedom to experiment and look back to pick up lost threads. It is not without significance that they were men who could afford such freedom. This freedom to experiment is the very fountain-head of evolution in design, and it was necessary at

this time and most fortunate for us that such a group of men lived who could, and did, devote so much thought and enthusiasm with the necessary freedom to do so. The story of design and craftsmanship in this country might have been a very sad one but for them. Indeed, the continent itself would be the poorer, for the movement begun in this country had a greater influence abroad and there is still evidence of the quick-witted adaptation of our craft movement of the late nineteenth century.

If, after nearly eighty years of effort, our fine craftsmen are only just beginning to fall into line with life it is not surprising, for they have had to re-establish a tradition that was all but lost. Even so the men and women who have done this are painfully few. We can estimate roughly how many craftsmen we have in the country who, at this moment, are covering the twelve major crafts of furniture, silver and jewellery, domestic and ecclesiastical glass, woven and printed textiles, pottery, ironwork, bookbinding, typography, engraving, embroidery and calligraphy, and it would be optimistic to quote at five hundred the number who have reached a standard that qualifies them to be called creative craftsmen in the sense to which I have been referring. Of these five hundred, some fifty might claim to have achieved a status that would make their work comparable to the great masters of the past; an average of four craftsmen per craft. This number may seem small at first glance but it is in fact a triumph that there are so many. With a concerted effort these few can build a future for fine craftsmanship that need not again be shaken.

But before the war they were scattered all over the country, out of touch with one another and, for the most part, with life. There was, after all, little indication that life was in any need of their work. The press was far from sympathetic, while a dreadful movement had developed that threatened to overgrow the true exponents of craftsmanship even more than the advent of the machine age itself because, like the willow herb that has covered the ruins of London, it offered an apparent solace to minds sick with ugliness, though it was not in itself of a true and healthy stock; and like all weeds it grew quickly and easily. This movement, known as the "arty-crafty" and "weavery loomery," was fostered only too well by many kind and well-meaning persons who were not aware of the rank weed they were cultivating so pleasantly. There was nobody to gainsay them for the real craftsmen had retired to the country in disgust with industrialism, before the arty-crafty ones had got under way. The towns saw exhibitions of good work occasionally—perhaps once every three years—as provided by the Arts and Crafts Exhibition Society. There was ample time for the public to forget these craftsmen between such exhibitions, if indeed it ever got to know them. This was more or less the position before 1939 although the arty-crafty pleasant and kindly had, as the result of the absence of any real values, given way to an arty-craftiness that was commercialised and vicious.

It is idle to speculate on how the real craft movement would have developed if the war had not started in 1939. Dispersed as they were, the craftsmen might have dwindled and found themselves ultimately overwhelmed, or, as can easily happen, isolation might have lowered their standards. We cannot tell, for the war came and with it a greater threat of extinction than anything that had occurred before. But great national calamities will cause men to face up to spiritual realities; when all else seems lost the spirit remains. The public looked for consolation to the arts, and the artists, in their turn, came together in a united effort to play their part. The

scattered societies, knowing very little of the opinions and activities of one another, came together to discuss their immediate problems. In the organising of this, the country is indebted to Philip James of C.E.M.A., now the Arts Council, and Sir Charles Tennyson, Chairman of the Central Institute of Art and Design, and its late Director, T. A. Fennemore. Artists, craftsmen, musicians, actors and writers gave all they could to a public that was in desperate need of the finer things of life. It was not an escape from the horrors of war but a universal realisation that creative work pointed to the right way of living. Standards of life that were threatened with extinction were maintained and held by these artists.

Out of this has sprung a greater unity among craftsmen than has existed for some centuries. Five societies, who by their standards can claim to be called major societies, have created a Crafts Centre of Great Britain that will function as a permanent exhibition, available to the public every day of the week. The organising council consists of representatives of these five societies and the policy is dictated by these craftsmen only. This house or centre will be opened shortly; it has the assistance and support of the government, and the public will be given an opportunity to subscribe. The high standard of work that will be maintained at this centre will be as much a guide to craftsmen as to the public. If there is an insistence that it is the aristocracy of craftsmen that are to be represented it must be pointed out that they are not snobs. There are, undoubtedly, thousands of craftsmen in the country who, by their skill and devotion, can claim a just pride and many of whom may ultimately qualify to rank with the present few. To swell the number of fine craftsmen is part of the policy of the centre. But we have been considering the highest possible standard of skill in creative craftsmanship; of those who achieve such a standard, there can be, perhaps, never more than a few. These few are the experimenters. They constitute a laboratory from which will emerge the future of design.

It may be fitting at this point to talk of the fine craftsman of to-day and of how he thinks and works—an easier thing to do than to conjecture on the past. The fine craftsman of to-day, as we have said, is an aristocrat in his work, but not a snob. His concern is, as it has been for all time, with the perfect balance between design and material. Sometimes his activities bear fruit in pieces made regardless of cost and labour, work which can be acquired only by the comparatively wealthy. These works cannot be denied him for such experiments are most fruitful. Many ideas evolved under such conditions can be adapted to simpler and more economic works; for his mind is much concerned that his work should be enjoyed by all men, rich and poor alike, for he has the same standards for all. The simpler article is a problem of adaptation, not one of cheapening.

He does, at times, turn to the problem of designing forms for machine production, and who should know more about form than he? How simple it is for him to appreciate the limitations peculiar to the machine, since he has been grappling with the problems of limitations the whole of his creative life. Industry has drawn from the craftsmen many of its best designers and will continue so to do. For it must be remembered that design is not something that is evolved on paper only. When the object is three-dimensional the true designer evolves his form from his material and with his tools. The fraction that must come off the thickness of the leg of a chair can

be perceived only in the wood. General shapes may be sketched and working drawings must be prepared on certain occasions, but the lessons have been learned while making the forms. This the craftsman of to-day has learned, and he holds it as one of his first principles, that design and craft are synonymous. Thus, the potter of to-day makes his large pots, tea-sets and porringers, expensive and cheap alike, with a true concern for his principles. The bookbinder is also prepared to include among his magnificent bindings a simple binding for the humble library. With all this he has no intention of competing with the machine, either in cost or time. It is no longer a monster to him but a necessary and separate factor of modern life. When he can assist the machine he will, but his firm belief lies in the importance of work that is controlled by his own hands. While aiming at perfection in his craft he knows that the perfection of the machine is sterile and not to be aped. He is aware that his work is not only a way of living for himself but that all men should know of the quality of life that is inherent in all great craftsmanship. For such work will point a way and maintain a standard of humanity without which civilisation is doomed. No civilisation has been great without the culture that springs from free expression in the arts. No government can hope to give a better life to the people without recognising the importance of the life that is expressed and passed on through the arts. For it is life that persists and is maintained through the works of man. It is the only way we have of passing on life, and giving it permanence. Men die and are forgotten, or their lives become nothing more than a few pages of a book; but their handiwork goes on through the centuries, reiterating their finest thoughts and ideals. Timeless as their work is, it links the past to the present from which a future emerges, a future that is constantly flowing backwards into the present to take its place in the past. The true and only test of any work is not who made it, or when it was made, but whether it is good, and this goodness belongs to no time and is self-evident.

DISCUSSION

THE CHAIRMAN: Now that Mr. Farleigh has read his paper you will have many things to think of and comments to make. Mr. Farleigh has spoken of William Morris who, as we all know, was something of a failure, not abroad but in England. William Morris had a Scandinavian strain in his make-up. He was a poet and understood the saga, and, as a result, his work appealed to the Swedish mind: to-day we see his life's work coming true in Swedish art.

Of course, Morris could be compared to Old Mother Hubbard who went to the cupboard to get the poor dog a bone. It is common knowledge that when she got there the cupboard was bare. We can imagine that the dog looked up with watering eyes and was doubtless surprised when Mother Hubbard seized a broomstick and hit him. This is how the Morris saga appears to many to-day. We have the consolation that there is something in the cupboard and that it has been provided by Mr. Farleigh and his band of craftsmen.

MR. J. SEYMOUR LINDSAY: I welcome this lecture if it is really going to do the almost impossible task of reviving public interest in quality, that is to say, in the work of the crafts. What we are suffering from is the fact that since the middle of the last century the public as a whole has not been conscious of craftsmanship, and if they do not demand it we cannot expect to see a survival of the craftsman. In order to be healthy, the craftsman must be essential to the community and must produce something which the community desires.

Architects, schools and universities have not taken upon themselves to teach the

people who go through their hands what real craftsmanship stands for, and that is delight. We have only to look at the everyday things of 100 years ago made by village craftsmen. Each one is an emblem of delight and has that careful finish, charming sense of decoration and, above all, utility which makes it a permanent thing of beauty. I hope we are on the brink of launching a campaign to educate and make the masses conscious of craftsmanship and what it really means. At the moment you have to go a long way to find something beautiful.

Sir HARRY LINDSAY: I was very much struck by the spiritual aspects of Mr. Farleigh's paper; it provides a great lesson for us all. It was based on an appreciation of the value of life and its richness and the quality that we wish to see inherent in the wider and fuller life. That is not, of course, entirely or only a matter of art, though art is all pervasive and reaches a far wider audience than, say, poetry or literature. Mr. Farleigh did not add poetry to his list of the fine arts—painting, sculpture, music and architecture—and, of course, in all those four arts you have the necessary preoccupation of the craftsman, that is to say that in each case he is handling actual physical materials. The poet is not handling physical materials, but the musician is because he is usually master of some musical instrument which may even be his own vocal cords. I remember a very striking leading article once published in the *Times Literary Supplement* called "Things Which are Written for Ever" which was recalled to me by the author's insistence on timelessness. Just as there are things which are written for ever, so craftsmanship may be "for ever" and it is craftsmanship of this high order which enriches the quality of life.

Mr. Farleigh, greatly daring, used a very striking word, the word "aristocracy", and said that there should be an aristocracy of craftsmanship. I once heard a speech by Lord Lothian in which, in trying to define democracy, he used that very term. "Democracy", he said, "can only succeed to the extent to which it produces a race of aristocrats". Then, after a dramatic pause, he added, "and I would define the aristocrat as one who gives more to life than he takes out of it". Mr. Farleigh, I am sure, would accept that as an equally happy definition of the aristocracy of craftsmanship.

THE CHAIRMAN: We cannot, I am afraid, convert the whole country into craftsmen. It would be impossible. Craftsmanship should enter into our daily lives. There is a thrill in making a fine thing and a thrill in possessing it. The craftsman gets a thrill because he is making something for posterity.

We have heard a very fine lecture and on your behalf I thank Mr. Farleigh for it. We have listened to a philosophical treatise in which the main point has been continuity. As far as the Arts and Crafts are concerned there have been no breaks since the beginning of time when man first moulded clay. Take for example this hall; everything in it is a joy—the craftsmanship of the plasterer, the work of the joiner, and so on. The question is often asked what is craftsmanship, where do we get it from? The answer is from the eye. The eye is circular, and that is the beginning of geometry. A craftsman gifted with an eye for proportion learns to draw in material, on material and with material. In fact, all the craftsmanship we admire is nothing more nor less than drawing in the round. When you look at the details of a mediæval church you are looking at drawing in the round. In days gone by they had no paper so they drew on the materials. You cannot describe the process of craft. The critic will tell you how it is done and the craftsman will say "Did I really think like that? I do not think I did". Again, touching on the question of the aristocracy of the arts and crafts, at one time the cottage of England was as well proportioned as the mansion; chairs and tables in small homes were as well shaped as those in palaces. To-day you cannot get such furniture.

I invite you to accord Mr. Farleigh a very hearty vote of thanks for his stimulating address.

The vote of thanks was carried with acclamation, and after a vote of thanks had been accorded the Chairman the meeting terminated.

SCIENTIFIC RESEARCH IN CANADA AND ITS LINKS WITH SCIENCE IN THE UNITED KINGDOM

By Dr. J. G. MALLOCH, M.B.E.

Chief Scientific Liaison Officer, National Research Council of Canada

NEIL MATHESON McWHARRIE LECTURE

Dominions and Colonies Section, Tuesday, November 18th, 1947

Sir EDWARD V. APPLETON, G.B.E., K.C.B., F.R.S.

Secretary, Department of Scientific and Industrial Research, in the Chair

THE CHAIRMAN: This afternoon we are fortunate in both our lecturer and his choice of subject, and I want to exercise my chairman's right of saying a few words about both. As chief Canadian Scientific Liaison Officer in London and as Scientific Adviser to the High Commissioner, our lecturer is a key man in the two-way traffic in scientific news and ideas continually flowing across the Atlantic. He is, to my mind, the very ideal of a scientific liaison officer partly, perhaps mainly, because of his personality and the atmosphere of friendliness and understanding which seems to surround him, and partly because of his training, experience and great wealth of scientific knowledge.

By birth, Dr. Malloch is a Scot. He was born in Edinburgh but when he was twelve years old his parents took him to Canada, to Edmonton, and in due course, he went to the University of Alberta where he took a degree in agriculture and studied bio-chemistry and cereal chemistry, taking his doctor's degree in 1928. He then joined the National Research Institute, set up by the National Research Council in 1932, shortly after it had been opened, and between then and the outbreak of the last war published as many as twenty scientific papers dealing with problems of wheat and flour. The main object of his research work was then the improvement of the quality of the wheat being exported.

At the outbreak of the war he became officer in charge of the physical research unit of the Canadian chemical warfare laboratory. We have heard a lot about physiologists becoming physicists and making their mark in such physical subjects as radar, and so it is a good thing to hear about a man who changed his job in the opposite direction. His change of job is an example of scientific broadmindedness and a man who can make a success of such a change must possess very wide scientific attainments. It is not surprising, therefore, that he should have been selected in 1945 to go to Washington as Canadian representative in the British Commonwealth Scientific Office. In that capacity he travelled more than 25,000 miles over the American continent before being appointed to his present post.

The first world war focused attention on the need for Government encouragement for research in the national interest and, as a result, there were set up in this country three research councils for scientific and industrial research, for agriculture and for medicine, all under the Lord President of the Council. Their constitution led to the setting up of similar bodies in the Dominions, first in Canada, by the formation of an Honorary Council for Scientific and Industrial Research, and afterwards in the other great Dominions. Largely through their work the scientific relations between Government, industry and the universities which, before their formation, were haphazard and fortuitous, have now been placed on a closer and more permanent footing. Very properly, each of those organisations set up in the different Dominions—and for that purpose Great Britain has Dominion status—has developed along lines most suitable to the differing requirements of the Dominions they serve. Between the wars they all had great achievements to their credit and all made very substantial contributions to victory in the second World War. The second World War brought into prominence not only the need for further research effort in every nation of the Commonwealth, but the need for continuing that close scientific collaboration throughout the British Commonwealth of Nations which had been a marked feature of the war itself.

Last year we had a Commonwealth Scientific Conference at which the foundation of permanent machinery for this purpose was laid, and I believe that those like Dr. Malloch, who helped to reach the decisions taken then, will be able to look back on the work they did with deep satisfaction and see in those decisions means by which the bonds linking the great Commonwealth family have been materially strengthened to the general benefit of all of us. I suggest that it is with thoughts such as these that we should listen to the lecture which I now call upon Dr. Malloch to deliver.

Dr. MALLOCK then gave the following lecture :

INTRODUCTION

The character of all national activities is influenced directly by geography and history or indirectly through their effects on economics, politics, or the character of the people. The organization and content of research in Canada and the character of the links with science in the United Kingdom are no exception. Canada is a comparatively young country liberally endowed with natural resources and her progress has depended to a large extent on the development of these resources. The energies of her scientists have therefore been devoted mainly to the solution of the problems connected with her primary products. Secondary industry, and hence industrial research, scarcely existed before 1920. Pressing practical problems have overshadowed more academic interests.

The size of the country, and the character of its climate, give rise to manifold problems of transport of goods, energy and people, and of the whole technique of living and working under extremes of temperature. These factors also introduce great geographical diversity in the needs for research. Apart from the great northland which is by no means homogeneous and which presents a whole set of distinctive problems, the settled southern strip is divided physically into four regions and politically into nine provinces. Geography has presented us with a wide variety of local problems and history with a federal constitution. These have combined to cause wide dispersion of our research institutions, not only in space but also in their administrative relations. The magnitude of the spacial isolation can be appreciated by remembering that Dalhousie University at Halifax is much closer physically to the University of London than it is to the University of British Columbia.

Canada's population of 13 million is very small in proportion to the size of the country. Correspondingly, her scientific man-power is small in relation to the magnitude and diversity of her problems. Also the small population cannot support an expenditure on research to the amount possible in the United States or even the United Kingdom. Nevertheless the real limitation has always been men and not money and this has been particularly true in recent years. Because our effort has been limited, the attack of some of our obvious problems has been delayed or at times tackled with inadequate resources in order that we might concentrate on some urgent major investigation.

In science, as indeed in most aspects of our national life, we are influenced on one hand by the proximity of the United States and on the other by our strong personal and historical ties with this country. In material things we are closer to the United States, but in our mode of thought, and particularly in our viewpoint on organization, the British influence predominates. Freely and gratefully as we

acknowledge our twin debt we have not been content that Canadian science should be a somewhat blurred double reflection from our physical and spiritual neighbours. As Canada, under the impact of two great wars, has progressed through adolescence to young adult nationhood, Canadian science has been emerging with a distinctive and purely Canadian approach to its problems.

RESEARCH IN CANADA

RESEARCH FOR PRIMARY INDUSTRIES

Agriculture.—In passing to a more detailed consideration of Canadian research it is appropriate to start with the greatest of our primary industries.

When the early settlers turned to agriculture the old varieties of grain from their homelands were found to be unsuitable and strange diseases and pests attacked their crops and herds. It was natural that the first major Canadian research organization should be founded for the investigation of agricultural problems. Even to-day, more money is spent on this branch of research than on any other subject. The Dominion Department of Agriculture works in practically every field of agricultural science and has experimental farms and specialized research stations scattered all over Canada. Most of the nine provincial governments have organizations for the study of the problems of their own sections. As universities were established, agricultural faculties or separate agricultural colleges were created and their staffs too took their place in the attack on the farmers' problems. The record of their success is impressive. Through the joint efforts of nearly twenty separate organizations, in which the Dominion Department of Agriculture has always played a leading part, it has been possible to push profitable agriculture farther and farther north by the breeding of new early maturing varieties of grain; the rust scourge which used to take such a heavy toll of the wheat crop has been defeated; major insect pests are subject to effective control and fruit can be grown in spite of severe winters. It would take a very large volume to tell the full story but I have time to refer only to a single major accomplishment—the breeding of Marquis wheat—a piece of creative research which, without any exaggeration, can be said to be the greatest single factor in the building of modern Canada. It was selected by Sir Charles Saunders at the Central Experimental Farm, Ottawa, from the progeny of a cross made by his father. Its agronomic characteristics permitted the large-scale extension of wheat-growing in Western Canada and its milling and baking quality established the reputation of Canadian wheat throughout the world.

Mineral Resources.—In the development of mining and the mineral industries what is now the Department of Mines and Resources has played a great part. In the vast northland adequate maps are a prerequisite for systematic prospecting and the survey branches of the Department have devoted much study to the application of improved techniques. The Geological Survey, often in conjunction with the universities, has provided basic information leading to the discovery of mineral deposits. The universities and the National Research Council are now co-operating in the application of modern geophysical methods to this task. Each new deposit presents different problems and the Ore Dressing Laboratory and the Division of Industrial Minerals have both done much to convert these potential sources of wealth into actual producers of revenue. In recent years the work has been carried

into the next stage, namely, that of metallurgy. A large and well-equipped laboratory has been established in Ottawa, and during the war it made very substantial contributions to the serviceability of war equipment produced in Canada. Research in connection with our mineral resources has not, however, been confined to the Dominion Government. The Research Council of Alberta has been studying problems connected with the vast coal resources of that province for the last twenty-five years, and attention has also been given to the development of the unique deposits of tar sands and the industrial utilization of the abundant supplies of natural gas. The Ontario Research Foundation has a large metallurgical laboratory, working closely with commercial firms. In addition, the mining and metallurgical departments of several of the provincial universities have made substantial contributions.

Forestry.—Research in forestry and forest products are also activities of the Department of Mines and Resources. Forest experimental stations are maintained in the main forest areas for the study of silviculture, forest tree breeding, forest management and allied subjects. Several of the provinces also do forestry work either through government departments or the provincial universities. The Dominion Government operates Forest Products Laboratories in Ottawa and at Vancouver where problems of the utilization of timber are the main concern. Somewhat further removed from the field of primary products, is the Pulp and Paper Institute at Montreal supported jointly by the paper industry, the Department of Mines and Resources and McGill University. Here the problems range from the suitability of forest species for pulping, through studies of the pulping process, to the printing quality of paper.

Fisheries.—Fisheries research deserves special mention because it is organized differently from the work on other primary products. The main research is carried out under the ægis of the Dominion Department of Fisheries, not directly, but through the Fisheries Research Board financed by the Department, which controls fisheries experimental stations and biological research stations on both coasts as well as a laboratory in the prairie provinces dealing with the problems of our great inland fisheries. On the biological side several universities contribute to the solution of the problems and in its special field the Institute of Parasitology at Macdonald College plays a major part. In all, the programme of research covers the life history of fish species, their food and habits, methods of detection and capture, processing, preservation and transport.

INDUSTRIAL RESEARCH

National Research Council.—Industrial research in Canada is of comparatively recent origin, mainly because our secondary industry owes its inception to the first great war and its major development to the second. In 1916, the Government established the Honorary Advisory Council for Scientific and Industrial Research, commonly called the National Research Council, whose first enterprise was to conduct a survey which showed that there was no industrial research and that there were insufficient scientists in training.

The real operations date from the passage of the Research Council Act in 1924. This act constituted the Council as a corporate body capable of deriving income

from sources in addition to the government appropriation. It gave very wide powers indeed for the conduct and support of research in any field of science or technology but no control over existing institutions. With the goodwill of the other research organizations, the flexibility resulting from these two provisions has enabled the Council to occupy a key position in Canadian research. It supports the supply of trained scientists by providing scholarships and bursaries. It encourages research in universities by grants-in-aid made either directly or through its associate committees. Through these committees and other devices those interested are enabled to co-ordinate their attack on major problems. It operates several large research stations, the most important being the main laboratories in Ottawa, the Aeronautical Laboratories and the Radio Research Station just outside the city, the Atomic Energy Research Establishment at Chalk River, and two recently established regional laboratories, one at Saskatoon, Saskatchewan, and the other at Halifax, Nova Scotia. With the wide powers conferred by the act the Council could embark on any field of research, but in actual practice it does not duplicate the work of other organizations. Decisions as to where a particular piece of work will be done are generally on a rather informal basis, and as a result it is sometimes difficult to draw any sharp line between the activities of the Council and other laboratories. For example, while metallurgical research in general is done by the Department of Mines and Resources, the Pidgeon magnesium process which achieved such importance during the war was developed in the National Research Laboratories. Work on the preservation of vegetables is done by the Department of Agriculture, while work on the preservation of animal products is done by N.R.C. Even with the self-imposed limitations the field of interest of the Council is very broad indeed and while the main concern of its own laboratories is industrial research, this term must be given a very elastic interpretation. The Division of Applied Biology is interested mainly in problems concerned with the storage and transport of food and the utilization of agricultural wastes and surpluses; the Chemistry Division in textiles, laundry, paint, rubber, particularly synthetic rubber, certain industrial chemicals and other products. The Division of Physics operates laboratories dealing with heat and insulation, optics with particular reference to aerial photography and mapping, sound and acoustics, radiology, metrology and electrical measurements. The Mechanical Engineering Division is concerned mainly with aeronautical research, both on aerodynamics and power plants, but also maintains a model testing basin and a laboratory for loose boundary hydraulics. The work in the radio field embraces radar in all its applications as well as problems in communications, and is associated with electrical engineering laboratories. A new division is just being organized to deal with building research.

The actual period during which the Council has been engaged in the investigation of peace-time problems is very short indeed. The main laboratories in Ottawa were not opened until 1932 in the midst of the severe economic depression when it was difficult to gather adequate staff, and from 1939 the whole energies of the organization were devoted to war research. There has not been time for long-range investigations to be brought to full fruition. Nevertheless, the Council laboratories have a record of sound, though often unspectacular, assistance to Canadian industry. A few of the more important accomplishments are: solution of problems of the

magnesite industry which converted it from a moribund condition into a national asset; in conjunction with the Bureau of Mines the technical problems in the establishment of the radium industry were solved; the railways have been assisted in the design of both locomotives and refrigerated cars, and Canadian laundry practice has been brought to a high standard of efficiency.

Industrial Laboratories.—The Ontario Research Foundation and, to a lesser extent the National Research Laboratories, carry on work on specific problems financed by industry, but research by industry itself in Canada is not of great magnitude. Most of our large concerns with sufficient resources to maintain research organizations are subsidiaries of United States, and to a lesser extent, United Kingdom companies, and the research laboratories are generally maintained outside the borders of Canada. There are, of course, some large industrial research organizations—those of the Shawinigan Chemical Company and the Consolidated Mining and Smelting Company are perhaps best known. Gradually, however, industry is developing its own research facilities. In the early part of the war, before Pearl Harbour, many of the Canadian companies found that information urgently required for war contracts was not available, and that the research could not be undertaken by the parent companies in the United States. This experience together with some encouragement by way of income tax relief is leading to the establishment of laboratories by quite a number of firms.

MEDICAL RESEARCH

Passing now from the industrial to the medical field, we find that research has been conducted almost entirely by the universities. Everyone has heard of the discovery of insulin at the University of Toronto, but this is only one of the more spectacular accomplishments. Just prior to the war the medical profession felt the need for a greater degree of co-ordination in research and at their request the National Research Council appointed a committee to interest itself in this field. About a year ago this committee was formally transformed into a Division of the Council, which, however, is distinct from the other divisions in that it maintains no laboratories of its own and makes its contribution solely by support and co-ordination of research in existing institutions.

Work closely allied to medical research is carried on by the Department of National Health and Welfare in the fields of industrial hygiene and the protection of the purity of food and drugs.

DEFENCE RESEARCH

Until just before the war, practically no research was carried out in Canada on behalf of the fighting services. From about 1935 the National Research Laboratories started to prepare quietly for possible war, particularly in the fields of radio, chemical warfare and ballistics. From this small beginning the Council developed into the official research organization of all three Canadian Services, and the staff increased from about 400 to 1,600. Gunsights, harbour defence, smoke-carrying craft, photographic flash bombs, the Habbakuk project, rations, clothing and boots for the troops, explosives and the like replaced the peace-time interests. Not only did the Council carry on a large volume of work in its own laboratories, but through it the entire scientific resources of the country were mobilised. When the war ended

the Council felt that it should return to its normal sphere, but military research could not be allowed to go back to its former state of neglect. The Government set up a new organization under a Director-General of Defence Research with status equal to that of the Chiefs of Staff of the three Services. With the Defence Research Board he is responsible for seeing that the research needs of the services are adequately covered by the services themselves, in special establishments or by existing organizations. Some of his investigations will be carried out by the National Research Council, particularly in the field of aeronautics and radar.

FUNDAMENTAL RESEARCH

The universities have played a great part in several fields of applied research, and some mention should also be made of the work in pure science. Unfortunately, it is not possible to point to great and spectacular achievements in this field, although some very sound work has been done. In a young country the energies of its scientists must, by force of circumstances, be devoted primarily to the pressing practical problems. Consequently, the work in fundamental science has been mostly of the nature of what Sir Edward Appleton calls "objective fundamental research". Craigie's discovery of sex in the rust fungus was one major achievement in this field. For the abstract pursuit of new knowledge to flourish, conditions are required which do not exist in most of our institutions. Nowhere in Canada will you find the peace and contemplative atmosphere of Oxford or Cambridge. We owe a debt to those who have persevered in spite of difficulties, but most scientists are too pressed with urgent problems or their duties in connection with the training of undergraduates to have the necessary leisure. In Canada we realise the importance of a solid foundation of pure research and efforts are being made, both in the universities and in other institutions, to provide the conditions necessary for its development. As an example, I might mention the recent establishment in the National Research Council of a Sub-division devoted entirely to fundamental chemistry. The members of the staff will be free to work on problems of their own choosing entirely relieved from the necessity of contributing to the solution of practical problems.

CO-OPERATION IN RESEARCH IN CANADA

This very hasty review of the work in the various fields of scientific endeavour has incidentally exposed the complexity of our research organization. At the Commonwealth Scientific Conference last year, Sir Henry Tizard extolled the virtues of untidiness in the organization of research, and the picture you have just been given would seem to give Canada an established place among the virtuous. The opportunities of overlapping and wasted effort are great, but in actual practice these vices are not serious, because we have built up the spirit and practice of co-operation. I wish to speak of this in some detail because it is the distinctive feature of Canadian research and has been developed to an extent which is unique. Moreover it is through co-operation that we are able to reconcile the influence of the United States and all its reverence for regulations and organization charts with the example from the United Kingdom of a more informal and certainly unchartable organization which exemplifies the Tizard Principle of Untidiness.

The main mechanism of co-operation is the system of associate committees established by the National Research Council in 1924 and now numbering about 40. Each of these committees deals with some major problem or with some broad field of research, and includes in its membership men from any organization who can contribute to the work. They virtually write their own terms of reference and indeed, in some cases, no formal terms of reference exist. It is only natural therefore that the mode of operation should vary widely. At one extreme the Associate Committee on Aeronautics, which includes representatives of the Air Force, the commercial air lines, the Transport Board, the aircraft manufacturers and the Research Council, brings the combined experience of all our aeronautical interests to bear on the formulation of the research programme of the aeronautical division of the National Research Laboratories. The closest parallels in this country are the advisory councils of the various D.S.I.R. establishments. On the other extreme there are committees whose membership consists mainly of the men actively working on the same problem in laboratories of different institutions. The Associate Committee on Grain Research, which incidentally is a joint project of the N.R.C. and Department of Agriculture, is an example of this class, and here the co-operation has been so close that often laboratories separated by hundreds of miles work on identical samples of grain and the authorship of papers reporting the results has been shared by men on the staff of three or four institutions.

The associate committees have some notable accomplishments to their credit. The Associate Committee on Field Crop Diseases brought the resources of the universities to the support of the Department of Agriculture and contributed substantially to the elimination of rust as a menace to the Canadian wheat crop. The investigations of the Associate Committee on Grain Research have been an important factor in maintaining the high quality of our export wheat. The Associate Committee on Survey Research with its sub-committee on air photography has provided the opportunity for co-operation between the survey branches of the Department of Mines and Resources, the Royal Canadian Air Force and the National Research Council, and its work has done much to establish Canada's leadership in the field of aerial surveying.

The value of the associate committees has not by any means been confined to their immediate accomplishments. By providing employment for our younger scientists on problems of major importance they have kept in Canada at least a small number who would otherwise have drifted to the United States. They have helped materially to break down the sense of isolation of the research men in our widely-scattered institutions. Most important of all, they have fostered that spirit of co-operation which now shows itself in so many ways in the structure and conduct of Canadian research.

On the formal side, this spirit expresses itself in interlocking directorates. The President of the National Research Council is a member of the Defence Research Board and of the Atomic Energy Commission, and the Council operates the very large Chalk River plant and laboratories on behalf of the Commission. When the Department of Reconstruction established a Research and Development Branch, Dr. Mackenzie, the President of the Council, was made its Director General, and it was difficult at times to draw any hard and fast line between the activities of this

branch and the activities of the Council. When British Columbia established a research council, it was laid down in its charter that one of the members should be nominated by the National Research Council, whose membership is composed mainly of scientists drawn from the Canadian universities and frequently the administrative heads of other scientific organizations.

Co-operation is often fostered by locating specialized research laboratories in close proximity to other institutions. The Dominion Department of Agriculture established its Rust Research Laboratory at the University of Manitoba. The regional laboratories of the National Research Council are both on university campuses, as is the Forest Products Laboratory of the Department of Mines and Resources in Vancouver. The Department of Agriculture work on forest pathology, and entomology has facilities at the Chalk River station of the Dominion Forest Service.

Even more important than these formal links between the different research organizations is the habit of mind which has grown up which leads us in Canada to bring to bear all the pertinent resources in the search for a solution to our major technical problems. We have now got to the stage where the means of making this co-operation effective have become very varied indeed and their nature has tended to become more and more informal.

LINKS WITH SCIENCE IN THE UNITED KINGDOM

With this growing spirit of co-operation within the country, it is not surprising that Canadian scientists as a whole look with sympathy on international co-operation. To-day I have to discuss particularly the links between Canadian and British science but only a distorted picture could be given without referring to our relations with the United States. It is because of our proximity to that country that our ties with the United Kingdom differ in some degree from those between this country and the rest of the Commonwealth. Australia, for example, looks almost solely to England, while we in Canada must look both south and east. Many of our students receive graduate training in the United States, and unfortunately all too many of them stay in that country. A substantial proportion of our scientific people were originally citizens of the United States, and not a few Canadian scientists have risen to positions of prominence there. Membership in U.S. scientific societies is widespread, and intimate personal acquaintance is very common indeed. In a large measure the closeness of the associations is due to the ease of travel between the two countries. Except for those in Eastern Ontario and Western Quebec, Canadian scientific institutions are closer in most instances to similar institutions in the United States than they are to their nearest Canadian neighbours.

In spite of the extent of our association with the U.S., there are very close bonds with science in this country, bonds which are subtly different in feeling. Canada is an American nation, but Canada is also a member of the British Commonwealth, and it is true to say that while our links with the United States are those of very friendly neighbours, our links with this country are those of members of the same family. Historically, the first connections were established by the migration of men of scientific interests to our universities, and other institutions. This movement still continues, and has even been expanded since the end of the war.

Canadian scientists have moved to England but not as frequently as from the rest of the Commonwealth, particularly from Australia. I might, however, remind you that Lord Rutherford was on the staff of McGill University before coming to this country. In recent times a Canadian has headed the work of the Food Investigation Board. The National Research Council frequently sends members of its staff to work for a year or two in British laboratories. At present there are four men in England under this scheme.

A substantial number of Canadian students have been trained here and we owe a great debt to the foundations which helped to make this possible, particularly the Rhodes, 1851, and Nuffield Trusts. Within the past month the group of Canadians, who started the famous Beaver Club during the war, have announced that the surplus from its operation will be used for the education of Canadian students in the U.K. Unfortunately the flow of British students to Canada has been much smaller than the movement of our students to this country. Very necessary steps are being taken to remedy this. The Agricultural Research Council sends men to train in our institutions. The Nuffield Foundation is experimenting with a scholarship scheme to encourage students to go from the U.K. to Canada and from one dominion to another. Within the last year, the Alberta Research Council has established two fellowships open to U.K. students, and within the past few weeks the National Research Council has initiated a scheme of post-doctorate fellowships, which will permit young scientists to work in the National Research Laboratories in Ottawa for periods of one to three years.

Co-operation in actual research projects did take place on a small scale prior to the war. For example, there was very close co-operation between the Division of Applied Biology in the National Research Laboratories and the Food Investigations Board of D.S.I.R. The Associate Committee on Grain Research and the Laboratory of the Board of Grain Commissioners worked with those here interested in grain problems, including the British Flour Millers' Research Association, and the laboratories of some of the milling and baking firms and consulting chemists. The war brought a great increase in co-operation of this sort. In Alberta a very large chemical warfare station was established, controlled by Canada but operated by a joint Canadian-United Kingdom staff. The close co-operation between Canada and the United Kingdom in nuclear research, first at Montreal and then at Chalk River, is well known. In the field of radar, the United Kingdom made available to us the results of the early researches, and Canada with this start, built a research organization with a staff of over 700, and an associated production organization employing up to about 10,000. The fact that some large British liners are now using Canadian-designed and -built radar sets to assist in their navigation is perhaps some small return for the information so freely given.

I might, if there were time, mention a considerable number of other fields—naval, military, and air, as well as food production and transport—where the co-operation during the war was extremely close. To assist in maintaining the contacts necessary for this co-operation, the National Research Council established a scientific liaison office in London in 1941 and at the end of the war it was decided to put this on a permanent basis. Although it is operated by the National Research Council, its facilities are freely available to all the scientific interests of the country. The

intention is not the establishment of a formal official channel through which all scientific relations between the two countries must flow. Such a policy would quickly have a sterilizing effect both on the office itself and the relations it is intended to foster. We do act as a post office to transmit documents and conduct a certain amount of formal business, but we consider this side of our work to be secondary. Our main aim is to encourage to the greatest possible extent close personal relations between scientists in the two countries. Of the measures to accomplish this, one of the most important is assistance to scientific visitors from Canada, and to scientists from this country wishing to see our work. Ensuring that these people have the opportunity to meet with their opposite numbers and to discuss with them matters of common interest is, we feel, one of our most fruitful activities. Where personal visits are not possible we try to inform those in Canada of work in progress here, and endeavour to initiate direct correspondence between the people concerned on the two sides of the Atlantic. We feel that the purpose of the office is best fulfilled when it is possible for us to drop out of the picture altogether and for co-operation to develop naturally as a result of direct contact.

The Commonwealth Scientific Conferences of 1946 proposed a number of measures to promote collaboration and in all these both of our countries are taking their full share. In addition there are the less specific links provided by membership of Canadian scientists in British scientific societies and through common membership in international organizations. Lectures such as those given during the past year by Sir Edward Appleton and Professor Rideal in Ottawa, and by Dr. Penfield, Dr. Steacie and Dr. Best here, assist materially to increase interest in the work each of our countries is doing. On both sides of the Atlantic there is a strong desire to strengthen the links between us. We believe that this can be done best not by the introduction of further new mechanisms for co-operation, but by the increased use of those that exist and particularly by greatly increased opportunities for direct personal contact between the scientists of our two countries.

My time has been too brief for the size of my subject. On every topic much more has been left unsaid than has been said and scant justice has been done to the work of our institutions. I can only hope that you have got a general impression of the scope and organization of Canadian research which may in some degree give perspective to the contacts you may have with it.

DISCUSSION

THE CHAIRMAN: I should like to ask the lecturer a question myself. The National Research Council's work, of course, is in the interests of the community and industry and results are available to all. The lecturer also mentioned the Ontario Research Foundation which I imagine does research for individual firms; so you have the two extremes—research for the benefit of everyone and that carried out for the benefit of one particular firm. In this country we have organisations which sit somewhere in between those two extremes—the research associations in which research is done for all the firms in a particular industry. Has Canada felt the need for some intermediate organisation for scientific research of that character?

Dr. J. G. MALLOCH: We have felt the need for some way of serving the smaller industrial firms in Canada but with a few exceptions we have not felt that the industrial research association type of organisation is suited to our conditions. It has been my observation that the most successful of the industrial research associations here are those

where the contact with industry is close. With our tremendous distances in Canada where an industry may be spread from one coast to the other, that close association between the laboratory and industry is not possible. We have applied something approaching the industrial research association organisation in the Paper Research Institute which I spoke about, where the industry pays a substantial part of the maintenance of that Institute, and also in our laundry industry, where we have got a special institution.

The distinction between the Research Council and the Ontario Research Foundation in the freedom with which they make their results known is not clear-cut. The National Research Council will undertake work for a firm and if the firm pays the whole cost the results belong exclusively to them. On the other hand although the Ontario Research Foundation works mostly on this basis, it does do work of a general character, particularly in agriculture, and such results are published.

SIR HENRY TIZARD: It is a very great pleasure to me to propose a vote of thanks. I have only recently returned from one of my few visits to Canada. This was the first time that I went west of Toronto, and, although I did not go as far as the west coast, I did reach Edmonton. When you are there you realise vividly the opportunities in front of Canada. It is most interesting to see the beginnings of an oil industry near Edmonton, which may possibly turn out to be of great importance. Then there are the great coal deposits, and the great agricultural land and rich minerals, all in one province of Canada which is still very thinly populated.

Canada is becoming an industrial nation. I think I am right in saying that most of the secondary industries of Canada started in the first world war. Already they have reached a very high state of technical efficiency. Dr. Malloch has referred to the very limited industrial research, but perhaps that is natural considering that most of the industries are only thirty years old. But he knows, just as I know, that there is some very high quality work going on in some of the older industries, as, for instance in the chemical industry.

Our lecturer has given us a very good description of the state of the national organisation for research in Canada. I can say from personal experience that the organisation is very fine indeed; a magnificent foundation has been laid. I agree with him that the weak point is the comparative absence of high quality fundamental research in the universities. Until that has been remedied, Canada will not, perhaps, reach the heights everyone expects her to reach.

I should like to take this opportunity of supporting the Chairman's opening remarks. Dr. Malloch has done great work over here and we are much indebted to him. We could not have a finer liaison officer. I should like not only to propose a warm vote of thanks to him but also to express our gratitude to him for what he has done in the United Kingdom.

The vote of thanks was carried with acclamation.

SIR ROBERT A. WATSON-WATT, C.B., F.R.S.: Dr. Malloch, as a brother Scot, will share my recollection of the importance which the Scottish people attach to the ceremony of kirkin, which is when a newly-married couple make their first appearance in church. It is a ceremonial and I am sure we are proud to be at the kirkin of our most recent Nobel Laureate. I ask to speak as one who has very recently returned from the happiest country in the world—so recently, in fact, that I believe I am wearing a collar laundered in Canada which was returned to me not after eight weeks or eight days, but eight hours!

As I listened to the lecturer's very impressive exposition of research in Canada, it struck me how appropriate it was that we should have Sir Edward Appleton in the Chair, as the head of the great organisation which most closely corresponds to the federal organisations of which Dr. Malloch spoke. Still further, I would refer to the thing that struck me very greatly in the all too brief summary given to us, namely, the relation between the federal and provincial research organisations. I was reminded also of the Chairman's activities as one who, in physical research, has a great federal responsibility for research as a whole and of that very remarkable provincial responsibility

for his own selected province in which he has attained cosmic scope. We are grateful to him and I will ask the audience to accord him a very hearty vote of thanks for presiding on this occasion.

The vote of thanks was carried with acclamation, and the meeting then terminated.

CORRESPONDENCE

PROPOSED NATIONAL MUSEUM OF LEATHER CRAFT

It will, I think, be generally admitted that a knowledge of the past is essential to the planning of future progress. In no field does this apply with greater force than in industrial design. It has not always been appreciated that a collection of representative examples of the products of an industry, which clearly shows the progress through the ages and demonstrates how the craftsmen of past times solved the problems of producing articles of everyday use with the materials and methods and in the particular idiom of their day, can be of the utmost help to those who, in our very different age, have the responsibility of providing satisfactorily for present day requirements. Such a collection is also invaluable in providing exemplary standards of fine workmanship for students and apprentices, as well as employers, whether they are concerned with things still largely made by hand or those in which machine-processes predominate. The national collections, whilst they include many fine specimens, do not at present meet the need, largely owing to their methods of classification.

The Education Committee of this Association, being appreciative of these facts, has launched an appeal, the avowed aim of which is to set up in due course a fully comprehensive National Museum of Leathercraft. It is thought that there may be reposing in attics or odd corners forgotten examples from past times, which would be of great interest either from the historical or craftsmanship angle, and which would be more usefully employed in inspiring the designers and workmen upon whom our future depends. A small but valuable nucleus collection already exists and my Committee would be most grateful if any reader of the *Journal* would write to tell us of any item which is likely to be of interest to this collection.

National Leather Goods and Saddlery
Manufacturers' Association.

JOHN W. WATERER.

OBITUARY

VICTOR ROY SMITH.—We regret to announce the death of Mr. V. R. Smith, President of the Confederation Life Association of Canada. He had been a Fellow of the Society since 1939.

Born in Ontario in 1883, and educated at the Collegiate Institute at Port Hope and Toronto university, Smith went in for Actuarial work. He rose rapidly in the profession and was at one time President of the American Institute of Actuaries.

STEWART BUTLER HUBBARD, J.P.—It is with regret that we announce the death, on November 14th, in Traverse, Michigan, U.S.A., of Mr. S. B. Hubbard, the Chairman of S. Hubbard, Ltd., of Luton and Aylesbury. He had been a Fellow of the Society since 1943 and was a Past Master of the Worshipful Company of Feltmakers.

WILLIAM JAMES UGLOW WOOLCOCK, C.M.G., C.B.E.—We regret to announce the death of Mr. W. J. U. Woolcock, a former Member of Council of the Society. Mr. Woolcock was elected a Fellow in 1927. He was Member of Parliament for Central Hackney from 1918 to 1922 and was at one time President of the Society of the Chemical Industry.

GENERAL NOTE

EXHIBITION OF ART FROM INDIA AND PAKISTAN AT THE ROYAL ACADEMY.—Such an Exhibition as this, now being held at Burlington House, was long overdue. General want of knowledge and the resultant indifference of the people of this country,

concerning the major arts of a land as great and prolific in artistic achievement as India, has for some time been a matter of concern to many of those who were better informed. Certain aspects of the arts of China, Japan, to some extent of Persia and, latterly, even of the South Seas have enjoyed a periodically varying measure of acceptance and selective adoption in England, although not always with the happiest effect. It is true that the great and memorable Exhibitions of Chinese and Persian Art, held under the auspices of the Royal Academy of Arts, did much to correct popular misconceptions in respect of the culture of those countries. But of the arts of India (now India and Pakistan), despite our close association commercially and politically during many generations, relatively very little was known to us outside the limited circle of those, whose careers were cast in India, and the few, who by inclination had chosen to interest themselves in Indian history and culture.

It has always been possible and practicable to arrange an exhibition of pictures and such small objects as could be assembled with comparatively little difficulty and as could be easily transported by normal means. But in the present case a much more ambitious scheme was conceived, by which large and heavy sculptures of the first importance to the study of Indian art—should be lent by the courtesy of the responsible authorities and transported to London. This project has been carried through.

It was early in 1946 that the Royal Society of Arts, the Royal Asiatic Society and the Royal India Society laid their proposals before the Royal Academy of Arts, and in his preface to the Exhibition Catalogue, Sir Alfred Munnings, P.R.A. records succinctly the arrangements made for implementing the scheme under which are now here in London some of the objects recovered from pre-historic sites of the Indus Valley culture, probably dating back to 2,500–1,650 B.C., including small sculpture in stone and bronze, terra-cotta figurines, finely designed seals and interesting jewellery. After a long unbridged gap of time the massive and impressive stone sculptures of the Maurya and Sunga Dynasties appear in the third century B.C. To this time belongs the very charming little bull, so beautifully groomed and polished, that formed the crowning symbol to one of the many Asoka columns and which is such an essentially Indian emblem to greet the eye as one looks across from the turnstiles towards the Central Hall.

The many sculptures and bronzes of later periods, down to early medieval, are probably all hierarchic—Buddhist, Brahmin, Jain and so on. There are temple cult figures, fragments from buildings and from Buddhist rails. On some fragments are carved incidents connected with the activities of the gods, of Buddha, and Bodhisattvas; and, especially in the free and often sketchy carvings from Gandhaar in the north-west, are found lively renderings of the Buddhist Jatakas. All this wealth of sculpture and the lavish and often very intricate ornament gives the impression of complete mastery achieved by the sculptor over the material. However hard and resistant the stone it seems to have been worked with the freedom of clay.

It need hardly be said that the things shown here, although comprising a number of examples of special importance as early links in the chain of historical development, represent a mere skimming of the surface. The vast quantities of material in the form of richly sculptured temple buildings and shrines and rock sculptures and deserted sites bearing sculptured fragments from disintegrated buildings scattered over many districts of India, attest the development of the sculptor's activities during long ages. Later periods are represented in the exhibition, mainly by the more domestic arts in which the Muslims show their mastery of design, colour and fine craftsmanship. Their carpets are unrivalled for richness and harmony of colour,¹ freedom of design and quality of fabric. Their exquisite calligraphy is exemplified in the several masterpieces shown. The collection of their pictures and miniatures is perhaps the finest ever assembled in a public exhibition, and is far too big and important to discuss in this brief review.

Both Hindus and Muslims show their skill and genius in many directions; notably in textiles—woven, embroidered, painted, block-printed, knot-dyed, wax resist and others; in jewellery, enamels, jade work, ivory carving among many more.

Of mural paintings there are no original examples in the exhibition, but a few fine enlargements of photographs taken in the Ajanta Caves afford some evidence of the existence of the most remarkable achievements in the world of this form of art.

To the artist and to the student of comparative art and its historic development the importance of the present collection rests mainly in the stone and bronze sculptures and the paintings. Both these sections, however, present difficulties to the average visitor. The stone sculptures are mostly fragments, which, lacking any indication of their original purpose and position, have only their quality of craftsmanship, in its widest sense, to recommend them. This difficulty applies less to the larger figure subjects than to those fragments which may be considered as architectural embellishments, and even these have often a story to tell or some traditional significance to which the observer has no clue.

With regard to the pictures, they will be judged by their qualities of composition, colour, style, brushwork and so on; but their subject matter will be recognised only by the few*. These inevitable difficulties were doubtless foreseen, and it may be hoped that enquiring minds will be stimulated to become better informed, to seek some enlightenment upon the obscurities and thus fulfil, in part, the aims of the promoters.

The business of organising, selecting the exhibits, packing, transport and subsequent hanging and displaying, has involved a series of very exacting tasks; and those who have borne the burden and worry of all this deserve the highest praise for the successful result.

A special word of appreciation is due for the admirably prepared catalogue. A work of very exacting nature, it provides, after the illuminating introductory notes, the essential information relating to each individual object, briefly, concisely, and as far as possible, accurately stated. It will be of great help to the casual visitor and will be valued by the student as a work of reference.

F. H. A.

NOTES ON BOOKS

"WOMEN: THEIR PROFESSIONAL STATUS. A WORLD SURVEY". Issued by the British Federation of Business and Professional Women. 1947. 10s. od.

To help the business and professional women of the countries overrun by the Nazis in the early days of the war in obtaining advice on their problems, and to provide them with opportunities for exchanging views with their British colleagues and women of other countries, the British Federation of Business and Professional Women set up the International Women's Service Groups, under the Chairmanship of Dame Caroline Haslett. As the natural corollary of this action, when the Federation later formed a Reconstruction Committee it invited the I.W.S.G. to co-operate in planning a campaign, the object of which was to secure that women should not be hampered in making their full contribution to post-war national and international recovery by the imposition of sex inequalities. As a starting point for further action the present *Survey* was put in hand.

Compiled by Miss Vera Douie, the Librarian to the London and National Society of Women's Service, from the relevant sections of Madame Thibert's *The Law and Women's Work*, the *Survey* seeks to cover the position of women in the years preceding World War II. Its seventy-eight pages are a model of clear and straightforward presentation; maps and tabulated summaries make for easy reference. An Appendix, compiled chiefly from the daily press and the women's periodicals, both British and foreign, gives an account of recent changes in the position of women throughout the world.

The *Survey* is to form the basis of the future work to be done by the Commission on

* The following books on this subject are recommended. Although mostly out of print they are readily available in libraries.

India—A Short Cultural History. By H. G. Rawlinson. The Cresset Press. (New edition to be issued shortly.)

Buddhist Art in India. By J. P. Vogel. Oxford University Press. 1936.

Primer of Hinduism. By J. N. Farquhar. Oxford University Press. 1912.

Indian Epics—Ramayana and the Mahabharata. By J. C. Oman. G. Bell & Sons, 1890.

the Status of Women of the United Nations Organisation, which has asked the Governments and women's organisations in each country to prepare a complete and detailed study of legislation concerning the status of women and the practical application of such legislation. Although it is pointed out in the Preface that conditions are not yet sufficiently stabilised for a new and comprehensive survey to be undertaken with advantage, it is somewhat puzzling to find no mention of the work being done by women in the various branches of scientific research, higher education and psychology. This seems strange when one considers the many important positions held by women as clinical and educational psychologists, psychiatric social workers and probation and welfare officers, to mention only a few examples.

In her Foreword to the *Survey*, Dame Caroline expresses the hope that it may stimulate women, not only to press forward with a survey of legislation affecting their rights, but also to assess their responsibilities in the great partnership of the United Nations.

J. S. R.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, DECEMBER 8. British Academy, W.I. 5 p.m. Professor S. R. K. Glanville, "The Contribution of Demotic to the Study of Egyptian History." Chemical Society, at the University, Edgbaston, Birmingham. 4.30 p.m. Dr. W. A. Waters, "Mechanisms of Oxidation."

Electronics, Institute of, at the Royal Society of Arts, W.C.2. 7 p.m. D. M. Corke, "Applications of Electronics to Vibration Research." Geographical Society, Royal, S.W.7. 5.30 p.m. Dr. O. H. K. Spate, "The Partition of the Punjab." Transport, Institute of, at the Institution of Electrical Engineers, W.C.2. 5.30 p.m. H. T. Duffield, "The Road Transport Industry and the Future."

TUESDAY, DECEMBER 9. Architects, Royal Institute of British, W.I. 6 p.m. John Gloag, "The Architect's Responsibility for Industrial Design." Chemical Engineers, Institution of, at the Geological Society, W.I. 5.30 p.m. N. H. Pratt, "The Heat Transfer in a Reaction Tank Cooled by means of a Coil."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. B. E. G. Mitchell, "Commercial Disc Recording and Processing." Illuminating Engineering Society, at 2 Savoy Hill, W.C.2. 6 p.m. Dr. J. H. Nelson, "Decoration and Industrial Lighting." Industrial Transport Association, at the Grand Hotel, Bristol. 7 p.m. Mr. Bevington, "Vehicle Electrical Systems and Equipment."

WEDNESDAY, DECEMBER 10. Dyers and Colourists, Society of, in the Queen's Hotel, Belfast. 7.30 p.m. J. Boulton, "What Research has meant to the Practical Dyer and what it will mean."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. H. Hurworth, "Some Observations on Oil Deterioration in Transformers and Switchgear." At the Heriot-Watt College, Edinburgh. 6 p.m. V. J. Francis and W. R. Stevens, "The High-Pressure Mercury-Vapour Discharge and its Applications." Kinematograph Society, British, at the Wellcome Foundation, N.W.1. 7.15 p.m. Ir. H. Verklinderen, "Reversal Processing."

Mechanical Engineers, Institution of, S.W.1. 6.30 p.m. J. C. Gillham, "Operation of the British Public Service Vehicle Industry." Petroleum, Institute of, at 26 Portland Place, W.1. 5.30 p.m. K. Hilfreich, J. C. McNicol and L. Rosenfeld, "Examination of used Engine Lubricating Oils."

THURSDAY, DECEMBER 11. Chemical Society, at the University, Liverpool. 4.30 p.m. Professor F. G. Young, "Hormones and Enzyme Action." Design and Industries Association, at the Royal Society of Arts, W.C.2. 1.30 p.m. Robert F. Wilson, "Colour in Industry." Electrical Engineers, Institution of, W.C.2. 5.30 p.m. R. Allan, "Electrical Engineering Problems in the Tropics."

At the Royal Hotel, Dundee. 7 p.m. E. Wilkinson, "The Klydonograph and Lightning Measurements." Foundrymen, Institute of British, at the Waldorf Hotel, W.C.2. 7 p.m. George Skript, "Mechanisation of Non Ferrous Foundries."

Horological Institute, British, at the Royal Society of Arts, W.C.2. 7 p.m. W. Charles Tucker, "Horological Trades as I have known it, and its Future." Photographic Society, Royal, 16 Princes' Gate, S.W.7. 7 p.m. G. B. MacAlpine, "Photography of Small Objects for Reproduction."

FRIDAY, DECEMBER 12. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. R. Poole, "The Design, Testing and Calibration of a Combustible-Gas Detector."

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. W. A. P. Fisher and R. B. Heywood, "Photo-Elasticity."

Royal Institution, W.I. 9 p.m. Professor H. Munro Fox, "Red, Green and Blue Blood."

TUESDAY, DECEMBER 16. Chemical Engineering Group, at the Geological Society, W.I. 5.30 p.m. J. G. Window, "Glass Equipment in the Chemical Engineering Industries."

Dyers and Colourists, Society of, at the Royal Technical College, Glasgow. 7 p.m. Dr. C. H. Giles, "Modern Methods of Colorimetric Analysis."

Electrical Engineers, Institution of, at the Cavendish Laboratory, Cambridge. 8.15 p.m. D. Gabor, "New Possibilities in Speech Transmission."

Eugenics Society, at the Royal Society, W.I. 5.30 p.m. I. A. Fraser Roberts and Eliot Slater, "Genetics, Medicine and Practical Eugenics."

Hull Chemical and Engineering Society, at the Church Institute, Hull. 7.30 p.m. Professor W. E. S. Turner, "Glass for Scientific and Technical Use."

Industrial Transport Association, at the Royal Society of Arts, W.C.2. 6.30 p.m. F. C. Wilmot, "Sector Distribution and Warehousing."

WEDNESDAY, DECEMBER 17. Chemical Society, at the Royal Institution, W.I. 5 p.m. Professor John Read, "Chemical Personalities a Century Ago."

Rheologists Club, British, at the Royal Society of Arts, W.C.2. 6 p.m. Dr. A. S. C. Lawrence, A. G. Ward and Dr. E. W. J. Mardles, "War-Time Rheology."

THURSDAY, DECEMBER 18. Electrical Engineers, Institution of, at the Trinity College, Dublin. 6 p.m. R. N. Berry, "Economics of High-Voltage Transmission by Underground Cables."

Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 5.15 p.m. H. A. Hirst, "Application of Rubber Bonding to Commercial Vehicles."

FRIDAY, DECEMBER 19. Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. Major-General Sir Bertram Rowcroft, "Problems Encountered by R.E.M.F." Metals, Institute of, at the University, Sheffield. 7.30 p.m. H. Evans, "Surface Finish and Electrolyte Polishing."

Sound Recording Association, British, at the Royal Society of Arts, W.C.2. 7 p.m. W. J. Lloyd, "Factors in the Reproduction of Gramophone Records."



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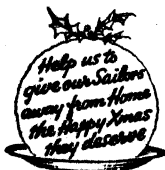
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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4758

FRIDAY, DECEMBER 19th, 1947

Vol. xcvi

DR. MANN JUVENILE LECTURES

The two customary Juvenile Lectures will be given in January, under the Dr. Mann Trust. The lectures will be suitable for children of twelve years and over. The details are as follows:

WEDNESDAY, DECEMBER 31ST, at 2.30 p.m.—“HOW WE GET OUR COAL”. By F. J. North, D.Sc., F.G.S., Keeper of Geology, National Museum of Wales. (Illustrated by lantern slides and films.)

This will show coal as a product of forests 200,000,000 years old, and how mining has triumphed over difficulties, cutting a seam and bringing coal to the surface, provision of fresh air in mines, prevention of rock falls and explosions, and mechanisation.

WEDNESDAY, JANUARY 7TH, at 2.30 p.m.—“WHAT WE DO WITH OUR COAL”. By W. Idris Jones, B.Sc., Ph.D., Director-General of Research, National Coal Board. (With demonstrations.)

This will be about coal as the real material wealth of Britain—a source of heat, light, and power, a raw material for manufacturing processes, and the source of town gas and various other valuable chemical products.

Refreshments will be provided after both meetings.

A few tickets are still available and Fellows are entitled to apply for one for each lecture (admitting one adult and two children). Those desiring tickets are, however, advised to apply to the Secretary as soon as possible, stating the number required and the date or dates on which admission is required.

AFTERNOON PARTY AT BUCKINGHAM PALACE

The Chairman of the Council and the Secretary attended an afternoon party, which was given on December 16th by Their Royal Highnesses The Princess Elizabeth and The Duke of Edinburgh at Buckingham Palace to representatives of Counties, Towns and prominent Organisations which had given presents to Their Royal Highnesses on the occasion of their recent marriage.

MEETING OF COUNCIL

A meeting of the Council was held on Monday, December 8th, 1947. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Sir Alexander Aikman; Mr. F. H. Andrews; Sir Atul Chatterjee; Sir Edward Crowe; Mr. E. W. Goodale; Mr. J. A. Milne; Sir Henry McMahon; Mr. E. Munro Runtz; Mr. Gordon Russell; Captain A. H. Ryley; Mr. William Will; Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary).

The following candidates were duly elected Fellows of the Society:—

Allen, Paul Douglas, M.A., Alexandria, Egypt.
 Anderson, Lieut.-Colonel John Philip, T.D., London.
 Anderson, John Stuart, B.Sc., PH.D., M.Sc., D.I.C., Didcot, Berks.
 Atkinson, Charles Arthur Philipp, Cleckheaton, Yorks.
 Aylwin, Miss Marian Kathleen, A.R.C.A., Winchester, Hants.
 Batchelor, John Lawrence, Derby.
 Best, Leonard William Brock, Coleshill, Warwicks.
 Boase, Thomas Sherrer Ross, Oxford.
 Cleaver, Reginald Claude, Coventry.
 Collins, Henry Ashley, South Harrow, Middlesex.
 Cooke, Stanley Dunning, London.
 Cooper, Miss Margaret, London.
 Corbould, Peter Marion, Sutton, Surrey.
 Cowley, George Ernest, Enfield, Middlesex.
 Cox, Professor Ernest Gordon, D.Sc., Leeds.
 Cremer, Herbert William, M.Sc., London.
 Darlington, Frederick, Huddersfield, Yorks.
 Doyle, James Dermott, Cape Town, South Africa.
 Ellis, Major Robert Louis, R.A., London.
 Ensor, Arthur Hinton, Wendover, Bucks.
 Farmer, Victor Edwin, Woodford Green, Essex.
 Ford, Frederick George Thomas, London.
 Freeth, Francis Arthur, O.B.E., D.Sc., PH.D., F.R.S., London.
 Goodden, Robert Yorke, R.D.I., London.
 Grunwaldt, Lieut.-Commander Henry, London.
 Harris, Reginald, London.
 Hart, Sydney, London.
 Hood, Norman Roy, PH.D., B.Sc. (HON.), Kenley, Surrey.
 Hughes, Eynon Lloyd, Carmarthen, S. Wales.
 Laidlaw, Professor George Norman, M.A., Saint John, Canada.
 Lloyd, Edward John Boydell, B.A., LL.B., Neston, Cheshire.
 McKend, Russell Adolphus Thadius, St. Vincent, B.W.I.
 Matthew, William Percival, M.B.E., Broadstairs, Kent.
 Morgan, Sir Herbert Edward, K.B.E., London.
 Newland, William Rupert, London.
 Pascoe, Sir Edwin Hall, M.A., Sc.D., D.Sc., Harpenden, Herts.
 Pryor, Edmund James, Wembley Park, Middlesex.
 Samson, Walter Macpherson, M.A., Parkstone, Dorset.
 Seymour, Almeric Hugh, C.B.E., M.A., Eversley, Hants.
 Simons, Lewis, D.Sc., London.
 Smith, William Nicol, Glasgow.
 Spittle, Leslie, London.
 Steel, George Simpson, B.Sc., PH.D., Monifieth, Dundee.
 Taylor, Irwin, Blackburn, Lancs.
 Thesiger, Ernest, London.
 Thomas, Harry Alfred William, London.
 Thornton-Smith, Ernest, London.
 Walker, Horace Thomas, Ramsey, Isle of Man.
 Whitehead, Stanley, M.A., PH.D., Hampton-on-Thames, Middlesex.

The following were duly elected Associates of the Society:—

English, Miss Margaret Joy, Hull, E. Yorks.
 Prashad, Kamta, B.Sc., Saharanpur, India.

Some financial business was also transacted.

"ORIGINALITY IN ITALIAN RENAISSANCE ARCHITECTURE"

By R. A. CORDINGLEY, M.A., F.R.I.B.A., M.T.P.I.

Professor of Architecture, Manchester University

SELWYN BRINTON LECTURE

Fourth Ordinary Meeting, Wednesday, November 26th, 1947

Mr. W. H. ANSELL, M.C., P.-P.R.I.B.A., *in the Chair*

THE CHAIRMAN : This afternoon we are to hear Professor Cordingley, who occupies the Chair of Architecture at the Manchester University, talking to us on "Originality in Italian Renaissance Architecture". Many of you know that the old system of training architects in England, that of pupilage, has been considerably superseded by the school system and that architectural schools have been set up in London and various other cities up and down the country. Two of these are in Lancashire—at Manchester and Liverpool. Liverpool has, for various reasons, come into the public eye rather more than Manchester, but Manchester has always refused to be overawed by its powerful neighbour and under Professor Dickie, and later under his successor, Professor Cordingley, its school of architecture has developed a method of designing rather characteristic of itself. It is a type of design which I would say is distinguished by its modernism while not neglecting tradition and yet infused with scholarship. Without more ado, I will call upon Professor Cordingley to deliver his lecture.

The following paper was then read:

The Renaissance of Architecture in Italy extended over more than four hundred years—from 1420 to c. 1850. Selwyn Brinton, the founder of the series of lectures of which this is the second, in his series of volumes under the title of "The Art of the Renaissance", adopts comprehending dates (1200–1800) which allow reasonable room for the full cycle of the architectural manifestation of that Art. Much more commonly among historians, the Renaissance in Architecture is held to have terminated about 1600. The discrepancy is a matter which it is purposed here to examine.

Italian Renaissance Architecture has suffered singular misfortunes of interpretation in the last hundred years. Ruskin is largely to blame. To him the Renaissance appeared an irreligious style, and one, therefore, to be abhorred. Undeniable æsthetic merit of individual works sometimes forced his reluctant admiration, but for the most part, he studiously ignored the style or blistered it with a passing phrase incidental to his adulation of the "Christian" medieval arts. His views, or views like his, have coloured in diminishing, yet still important, degree almost all estimates of the values of the style made up to recent times.

Thus, as views now stand, the earlier and formative phases of the style are universally admired; the later phases remain in high disrepute, except in the instance of a few famous monuments or among the more enlightened enquirers and writers. The two stages are distinguished by separate terms, the "Renaissance" for the first stage and the "Baroque" for the second. In this way the part is made to appear as the whole; and this is not accidental, for most writers on architecture are at pains to prove a high distinction between the two, discerning a sharp change of trend and character at the junction between them. The Renaissance, according to these writers, did indeed end at a given point, to be succeeded by another, related but clearly distinguishable, historical style. One, the "Renaissance" naturally,

is shown as of mostly admirable qualities; the other, the Baroque, as mostly disreputable and not infrequently vile. The date set for the division between the two varies considerably, but about 1580 is a usual choice.

The sharp distinction—a false one, it is hoped to show—is made almost exclusively upon grounds of external character and effect, and the Renaissance is deemed to last just so long as ancient Roman precedent is followed in matters of decorative detail. This is a too narrow, and, under the special circumstances, unstable a basis for a proper evaluation. The normal historical kind of review is much to be preferred; but there is partial justification for the standpoint in that the Renaissance architects, like the Greek, themselves had adopted the æsthetic objective; just as, on the other hand, the Romans and the medievals absorbed themselves outstandingly in practical, constructive endeavours. But too much room is left for the vagaries of taste and further deliberate judgment depends too importantly on accurate attribution of the origin of the decorative elements used. There is no kind of doubt that the Renaissance drew considerably upon ancient Rome for its stock of decorative motifs, but this dependence frequently is exaggerated and attributions of origin quite often are at fault. In archaeological ignorance sometimes, but quite consciously at others, the Renaissance borrowings were from the Early Christian or Romanesque, quite apart from the perpetuation of Italian medieval practices as the foundation of the Renaissance style. Too readily it is taken for granted that Renaissance classic is of the Roman kind. Sometimes, in recent days, Renaissance motifs have been used inferentially, as evidence of Roman architectural methods, but this is a most unsafe proceeding. As will be shown, there was much that was quite distinctive in the Renaissance usage of the decorative elements. They did not copy direct, but adapted and developed their own systems. They invented too, and combined the classical, old and new, with motifs derived from other architectures of intermediate times.

A true evaluation necessitates consideration of the movement as a whole, and the Baroque was a part of that whole. At the outset of the Renaissance, and for long thereafter, ancient Rome provided a stimulus, but this did not endure at the same intensity throughout. In fact, during the Baroque phase, it was so slight as to be negligible. Renaissance character must not, therefore, be measured, in any sense, by the degree of its dependence upon ancient Roman architecture. This must have been merely incidental to it. It emerged from that dependence and reached maturity as a style, conditioned by circumstances yet to be examined; though it is unnecessary to decide at what particular point in its evolution it reached its finest æsthetic expression. Seen in this light, the so-called "Renaissance" phase was a stage of experimentation and development, not, by any means, an evolution in itself. Instead, the culmination, in the historical sense, lies in the Baroque stage.

This is quite different from the usual interpretation, which would represent the onset of the Baroque, about 1580, as a revolt against academic purism in the deployment of the time-honoured classical elements, which, it is said, had come to be used with too meticulous and deadly a formality. Yet it has never yet been shown in what group of buildings this particular kind of rigidity exists. Nor are architects instanced, though sometimes we are told, almost in the same breath, that Palladio (especially) and Vignola were the ultimate purists—perhaps because they were authors of the most famous of the literary codes on the use of the classical elements—and yet that

neither held strictly to his own precepts. They were, if we compound the typical but contradictory statements made about them, archæologically-minded, hide-bound pedants and free-thinking, original, inventive practising architects. That they were academic in written theory and emancipated in their practice is not the explanation, for the universal popularity of their writings is attributed to the originality of the ideas expressed in them and the fitness of those ideas for contemporary use. However, there is this unanimity in modern writings; there was little or no further reference made to ancient Roman architecture, once the Baroque was fully under way. The independence of the Baroque, all admit, was virtually complete. The occasion to invent a "revolt" against pedantry and the observance of "strict classical precepts" arises from the common interpretation of the course of the Renaissance up to that point as a regular progression towards the complete recovery of latin architectural ideals and methods. Unfortunately for this contention, it is notorious that the ancient Romans had very low artistic taste, and no better than rule-of-thumb decorative methods.

For convenience of review, the architectural manifestations of the Renaissance need suitable sub-division. The common use of the term, in architectural circles at least, for a part of the whole is to be regretted, but it would be even more confusing here to attempt to substitute a new one. One may accept then, the "Renaissance" as the precursor of the "Baroque", though not admitting a break of logical development between them. In Italy of these times, accurate chronological subdivision is even more than normally impracticable, for the political severance between part and part occasioned developments at varying rates and the formulation of local schools with markedly individual practices. The dates to be given here, then, are highly generalised, and are stated in round figures.

The "Early Renaissance" (1420-1500) was followed by the "High Renaissance" (1500-1550). A stage of "Transition" ensued (1550-1600), and introduced the "High Baroque" (1600-1700) within which lay the culmination of the style, at about 1650. The "Late Baroque" (1700-1750), wherein there is a trend towards the "Rococo" (a lighter version of the Baroque), might be taken as the closure of the Renaissance proper, since thereafter the Italian is no longer an important originating source, but reflects instead developments taking place in France and countries elsewhere. The cycle of the movement was not then, however, completed, as in Northern Europe and England an "Antiquarian" Phase of some complexity followed (1750-1800), largely classical and tending increasingly towards the "Neo-Grec". The latter, the Neo-Grec, might be embraced roundly in the dates 1800-1850. It was the dominant though not the exclusive manifestation throughout the greater part of that time.

The Renaissance masters were activated almost exclusively by æsthetic ideals. They were most able too in constructive science, but this to them was a means to the æsthetic end, and not an end in itself. Here lies a mighty distinction between them and their Roman forbears, whom they purposed to emulate. Old Roman greatness lay in their political and economic system, not, certainly, in any decisive way in their arts. They were colossal and progressive builders, but this was the incidental outcome of their dominant political position and the vastness of their domain. They were builders by need rather than by inclination. Primarily they built for utility;

secondarily, to exhibit to all the crushing magnitude of their power. Ordinarily, their buildings were severe; where needed for display, they were pompous, coarse, or dispiritedly monotonous.

Thus it could not be artistic guidance which the Renaissance sought of Rome; nor, as can readily be shown, was there much relevance to fifteenth century need surviving in Roman constructive methods. What the Renaissance masters found in the ruins of Rome was heady, intoxicating inspiration, a formal axial system of disposition and a mine of carven or modelled decorative "novelties", which they might adjust and improve by their superior art craftsmanship, using them then in their own distinctive ways in contemporary buildings with a discretion which far surpassed the ancient Roman. The mouldering monuments of Rome, their crudities of ornamentation, where it survived, softened by the passage of centuries of time, more potently conveyed the mysterious power of a master race than they had ever done when rawly new. Grandeur survived, and was magnified by the exercise of sympathetic imagination.

Yet close comparisons show that, in the Renaissance, Roman precedent was followed just so far as it suited contemporary needs and tastes. Beyond elements of architectural ornament, direct imitation was rare, and, in the main, limited to the acceptance of a quite small range of selected "motifs"—*i.e.*, assemblages of standard details, themselves resolved into standard arrangements as a whole—of which a notable example is the so-called "Roman Order", which means an arch enforced between columns or pilasters of one or other of the Orders. Exact copying was rarely, if ever, attempted, and this was not only because it was usually impracticable in the light of the essential difference between the old and the new buildings, but also because the ancient arts were found to be inferior. Whatever was borrowed was in greater or less degree re-designed and re-cast to suit the new terms and tastes. Despite the fulsome praise accorded, Renaissance architects paid no greater tribute to latinism than their artistic integrity allowed. Ancient authority was needful, but deference to latinism meant no more than that their buildings should have the classical air, or that currently supposed to be classical.

Thus then, even in matters of outward effect, not to speak of inner spatial arrangements and constructive methods, the Renaissance debt to old Rome was but partial. In artistic quality the later architecture was far superior. The mode of using such detail as was borrowed was fresh and original, and the details themselves were re-cast. With these Roman elements too, as has been said, others were associated which had been a legacy from the intervening historical phases; and some were new inventions. If this degree of independence of the antique can be established for external character, the case for the integrity of the Renaissance style is already well made, for in all other architectural respects the connection is slender indeed. Buildings are different in type, in spatial organisation, in the structural devices employed and in the constructive methods used. Materials differ too. In all these matters there was no break in continuity of development between medieval and Renaissance. Medieval practices were not abandoned, although the pointed arch was seen no more. Palace, house and Christian church remained of the medieval types and continued to fill all principal needs. In Italy, and especially in Florence, where the style took its rise, medieval architecture was a compound already, of the native Early

Christian and Romanesque succession to the Roman on the one hand, and of the kindred Byzantine on the other. These ingredient styles were each important to the eventual character of the Renaissance style. Once launched, there is no further contribution of importance made to the Renaissance from any external source, so far as fabric and structural method are concerned. It proceeded on its own impetus, and in these connections followed a consistent course clear through to the Baroque and beyond.

To our northern eyes, attuned to a Gothic of a very different kind to the Italian, the very earliest of the Renaissance churches appear at first sight to have been transformed into classical character with almost miraculous speed and completeness. Yet in such as Brunelleschi's S. Lorenzo (1425), there is very little that is of direct Roman inspiration. The plan and disposition, so far from reverting to the ancient prototypes, are closely similar to those of S. Croce in the same city, a building

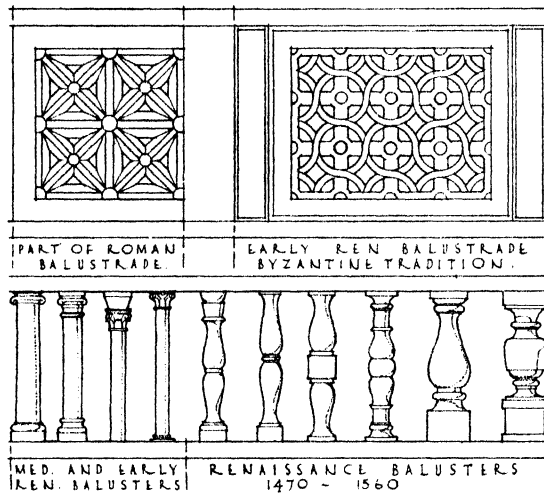


FIG. 1.—This demonstrates the development of the Renaissance balustrade

founded only in 1295, though the later church is much the smaller. Its vaults, such as there are, are light vaults of Byzantine form with no resemblance whatsoever to the massive coverings the ancients had used, and the preponderating arcades, graceful arches poised on column caps, repeat a motif endlessly reiterated in Tuscan medieval churches, but of which there are almost no ancient Roman instances. Similar arcades adorn eleventh century S. Miniato and the baptistry of the cathedral, both of them revered monuments in the city.

The western front is featureless and blank, toothed in brick for a sumptuous marble façade which it never received. Such independent conception of the frontispiece, a concentration of emphasis effected at the expense of the flanks and rear of a church, which, comparatively, remain arid, is another non-Roman practice—not new with the Renaissance by any means, as the elaborate marble "Gothic" frontages of the Siena and Orvieto cathedrals go to show, but one which persisted throughout the Renaissance from first to last. Witness, for example, the

absurdly pretentious, early-period frontage of the Certosa at Pavia, dating mostly from the end of the fifteenth century, and the late-Baroque cathedral at Syracuse, of 1728-37. Incidentally, we have here countered one of the discriminatory charges of insincerity often levelled against the Italian Baroque. The delightfully delicate arcade of the S. Lorenzo type too persisted, and although not antique, became a regular part of the Renaissance stock-in-trade. So distinctive indeed is the type, that it is commonly known as the "Renaissance Arcade" to distinguish it from the classic "Roman" arcade to which reference has been made before.

The easterly parts of S. Lorenzo follow the medieval traditional arrangements, and among them is a galleried cupola over the "crossing" of the latin-cross plan. Byzantine influence occasioned this tradition, but it is one to which the Renaissance gave clearer definition. Byzantine inspiration almost exclusively is responsible for the initiation of that second kind of church arrangement to which the Renaissance became heir—that in which the space enclosed is highly centralised beneath a dominant dome, this being attended by subservient uniform wings, and the whole assuming a "greek-cross" (equal-armed) pyramidal disposition. A whole series of chapels and churches of this kind, beginning with Brunelleschi's Pazzi chapel at Florence (1420), extends through the Renaissance to its latter end, beyond the Baroque. The development of the dome, whether for the crossing of the latin-cross church or for the culmination of the greek-cross plan, is the most notable of Renaissance achievements. Gothic modes of light, exquisitely-poised structure are wedded to the use of Byzantine constructive devices, and the wedding produces an extensive and comely progeny. The first fruits are seen not alone in small churches and chapels such as that of the Pazzi, or of S. Maria delle Carceri at Prato, but too in the grand monumental dome of Florence Cathedral, Brunelleschi's mightiest and most skilful creation. Here, however, the Byzantine contribution is limited to the fact of the use of the dome as the culminating element, and perhaps, too, the manner of use of ribbed construction. For the rest, in so far as the dome is derivative at all, it is Gothic.

Much false colour has been lent to the circumstances of this structure by the assumption that, because Brunelleschi studied so assiduously among the ruins of Rome, he must have secured key ideas from them. He got nothing towards this particular structure except a colossal ambition to equal or outdo the achievements of the ancients. The Pantheon may well have stirred his imagination, but it offered no clue towards the solution of the Florence cathedral problem. The essential principle is entirely different. The Pantheon vault, like all Roman vaults, is massively buttressed; the Florence dome is tied together by bands about its base. This was a wholly new idea which opened up endless avenues for new endeavours in structural design, an idea which was elaborated and exploited to the full by later Renaissance masters. The need for buttressing obviated, or very much minimised, the dome could be raised aloft to allow the insertion of fully adequate windows in a "drum" interposed below it, and the whole could then be exploited for grand external as well as internal visual effect. In other domes, more slightly than Brunelleschi's, the incorporation of further structural devices (pendentives) permitted the use of the domical termination over any kind of regular base plan, not only round or elliptical (for domes even of this shape came to be used), but square, octagonal and

rectilinear too. Due to Brunelleschi's invention, the dome came to be the almost inevitable crowning feature of every church or chapel, and the dominant, and not infrequently the exclusive, form of covering used. The experimental stages of development of this magnificent feature were traversed in the Early and High Renaissance stages of the style; St. Peter's, on the threshold of the Baroque, is the first major instance of thoroughly mature design. Afterwards, Baroque Rome became a city of splendid domes.

The first onset of the Renaissance produced little outward change in palace design, and at no time do external influences importantly affect the established or developing modes of living or methods of use. On the other hand, medieval constructive character, protracted into the Renaissance, contributed an initial suggestion for a fresh range of decorative techniques, which, thereafter, the Renaissance masters infinitely exploited. The new range was that of rustication. Now there are endless instances of Roman rock-faced masonry, yet these are in no case deliberately designed to be decorative. They occur in the Roman idea as an incidental economy in constructive works outside the architectural pale. Nor do the Roman instances occur on those parts of buildings embellished with columns or their decorative adjuncts; except in one or two instances such as the Porta Maggiore at Rome where however, the structures manifestly were never completed. The rustications here were intended to be dressed off, but the work was never wholly done. The ancient Romans never came nearer to the deliberate use of rusticated decoration than the occasional chisel-drafting along the joint-lines in the otherwise smooth masonry of certain temple cells. This is not to say that the old Roman instances, accidental though they are, did not offer suggestions to Renaissance enthusiasts.

Renaissance initiative in this direction begins at once, in Florence again, with the first domestic building in the new style—the Riccardi Palace (1430). Every centre in the country in due course developed its local variants; the stones left rough and characterful, or bossed and faceted in high artificiality. At first restricted to wall surfaces, rustication soon came to be applied too to the Orders themselves, as, notably, in the work of Sanmichele in the Verona region (*e.g.*, Porta Nuova, 1532) or of Alessi and Lurago (Porta Pila) in ornamental town gateways at Genoa. Palladio imitated it in stucco; Vignola expanded its range of use to the enframing of masonry panelling and to the embellishment of garden ornaments. In stucco, and in a variety of extravagant forms, it became the dominant decorative motif of the garden grotto and the artificial waterfall and cascade. It invaded the surrounds to windows and doors, and was used even on balustrades, stringmoulds and cornices. In short, rustication took its important place among the Renaissance decorative resources. French, English and German, as well as Italian Baroque art would be much the poorer without it. At certain phases in the development of the several national styles, rustication is sometimes almost the sole decorative device employed.

Whilst on this point, another purely Renaissance decorative invention may be instanced—that of the baluster. Roman parapets, if not solid, were commonly of palisade character, patterned with interlacings in the panels, imitating wooden prototypes. The Byzantines used these too, but also developed a distinctive practice in which the panel is a carved or pierced slab, supported between posts. Italian

medieval practice varied, in part it followed the Byzantine, but more characteristically, tiny columns of simplified classical design carried miniature arches, which, in turn, supported the parapet rails. Both the Italian medieval usages survived into the Renaissance. Instances may be found in the chapel screens in Alberti's re-modelled S. Francesco at Rimini. The true baluster, as we know it to-day, is first traceable in the Colleoni Chapel at Bergamo (c. 1470-6). Hereabouts in the Milan region, there had been proceeding an exhaustive series of experiments with candelabra-like forms of ornament, applied as architectural decoration, and a wide range



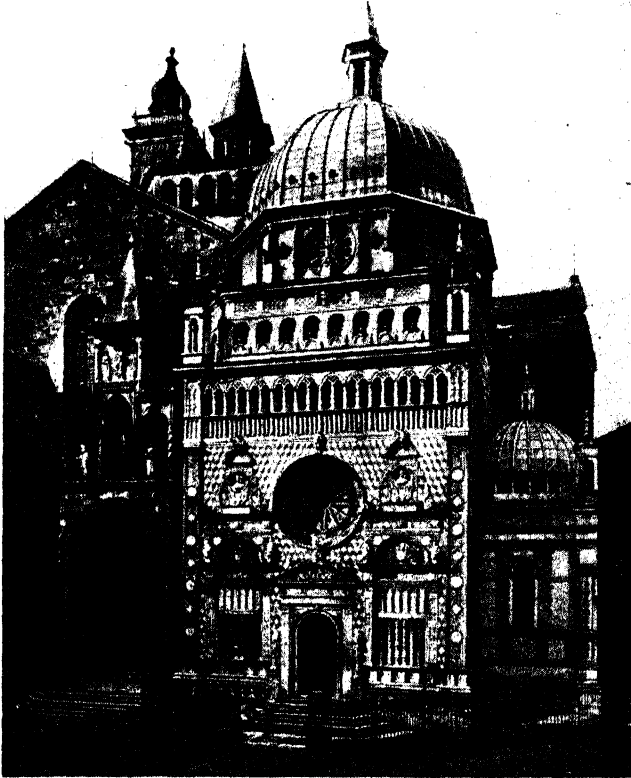
(Photo: Alinari)

FIG. 2.—S. Francesco, Rimini (L. B. Alberti, 1446)
Variant types of Early Renaissance balustrade

appears on this building. The use of the true baluster spread rapidly. It appeared both in Rome (Sistine Chapel) and Venice (Pal Corner-Spinelli) by about 1480. By the end of the century, the older forms of parapet had almost wholly disappeared. The initial simple baluster, symmetrical in its upper and lower halves, soon gave place to the familiar type, weighted heavily in the lower part of the sleeve; but many variants subsequently were invented, especially in the Baroque phase. The progress of balustrade design is a good index of the date of monuments.

Surprisingly little initiative was shown in ancient Rome in the exploitation of the decorative possibilities of the Orders of Architecture. The arrangements in common

use extended little beyond the simplest form of colonnade and arcade, and the combination of the two into that motif most typical of their architecture, the so-called "Roman Order". Richer and more complicated devices rarely were used, and, even so, in single units for the especial decoration of comparatively small monuments, or for the elaboration of special parts of the larger ones. Tombs and sepulchral monuments, triumphal arches and the scenæ of theatres are practically alone the subjects of decorative variation from the universal monotonous themes. Pedestal, parapet and other adjuncts were used, and the "tabernacle" window or niche, but



(Photo: Alinari)

FIG. 3.—Colleoni Chapel, Bergamo (G. A. Amadeo, 1470-6)

This affords perhaps the earliest instance of the true baluster (open arcade at top of facade)

none of these appears to have been an original invention on Italian soil. There are Greek Hellenistic precedents for each.

The Renaissance materially extended the range of standard decorative motifs in regular use. Mostly, the new themes were invented afresh, for all that a careful search may disclose an occasional Roman instance of each. Such dubious precedents would very likely be the outcome of accidental and not calculated combinations. How frequently, for instance, is the "coupled" colonnade used in Roman times in extension beyond a single bay, or that further type, in which the spacing of the Order is alternately wide and narrow? These are very familiar dispositions in the

Renaissance. As a common practice, the Renaissance masters employed three types of colonnade to the Romans' one; they used a similar range of variants for their own "Renaissance" arcade. Similarly they extended the "Triumphal Arch" combination into three or four alternatives and developed from it a still further range, indicated by that arrangement known later as the "Palladian Motif". Still further, Renaissance ingenuity developed formal systems in which one type is interwoven with another—a larger Order running with a smaller, colonnade with colonnade, arcade with colonnade, and so on. The full extent of these formalized devices would take too long here to enumerate. To all, or nearly all, rustication, too, might be applied in one of the many alternative forms. It becomes clear that the Renaissance identity is not only distinct but that the style is superior to the Roman in variety and range as well as in artistic quality. Even so, these are superficialities; more vital are the variations between the two rooted in the respective fabrics, the body of architecture itself.

Renaissance architecture of the fifteenth century, seen as a whole, is experimental. At the end of it, church and palace have developed in their vital dispositions, though not markedly, in the general direction of greater regularity and formality. Yet the several improvements of organisation have little otherwise to do with the antique; they are modernisations emerging naturally from Italo-Byzantine medieval usages. Externally, the changes are more marked, for by successive modifications of individual details, architectural effects have acquired the classical air, many of the characteristic decorative motifs having been developed meantime.

In the next half-century, competence in the modern style has so advanced that architects display their facility not only in the discreet choice and use of the decorative elements, but also in the mass composition of buildings. Roman principles of axially and formal relationship of parts are now thoroughly ingrained, and, as experience ripens, allow increasingly of building deliberately for effects preconceived in precise detail. Renaissance architects now were marching fast towards emancipation from Roman tutelage. Their scrutiny of the ancient ruins for novel details and ideas had become steadily more systematic, if less serious, and we can see in the architecture of the day that many fresh borrowings were made at this time. The well, however, was nearly dry, and by mid-century there were already some architects who had turned their backs on Roman art, confident now in their powers and competent to make original experiments. After more than a hundred years, the attitude towards ancient art had changed from respectful deference to tolerant patronage. Interest in it lay more with the connoisseur and collector than with the artist and architect.

It is true, of course, that the face of Renaissance architecture was never more like the Roman than at this mid-sixteenth century time. Since the borrowings of ancient motifs were cumulative and ceased very soon, the point is obvious. Yet in general, the likeness was even now quite slight and certainly has not the significance usually attached to it. The kinship was less, not more, strong than before. In the essentials of spatial organisation and structural method, the two architectures were at no time particularly close, and never more so than at the outset. The trend thereafter was increasingly divergent. The cause of the break was incompatibility, increasing, naturally, as the Renaissance individuality developed. There was no hiatus or violent distortion in the Renaissance growth at this or any other stage. It followed a natural

course and achieved a climax in its own right. The greatest debt due to Rome was that for the classic principles of formality, for the rest, as has been shown, certain details were acquired, but they were assimilated, not imitated, digested and transmuted into decorative systems nearly always original in themselves, and always used in distinctive ways.

The assimilation of the borrowed elements took time, and in the degree appropriate to the extent of the borrowings at any time, outward effects were more constrained to the antique than was representative of the inner arrangements. When the source failed, or was disused, the true character soon emerged. Thus,



(Fk to Alinari)

FIG. 4—*Doria Tursi Palace, Genoa (Rocco Lurago 1564)*

we have the spectacle of Genoa, a comparative "late-starter" in the Renaissance race and standing a little aside from the ancient tradition, producing fully emancipated and integrated architecture as early as the 'fifties and 'sixties of the century, whilst the Renaissance of Rome itself had scarcely entered upon a stage of easy transition towards the eventual Baroque. The Genoese Baroque, if it is proper to call it such, is built directly upon the foundation of the Early Renaissance of Florence and the north, thus short-circuiting that further schooling which Bramante, Perruzzi, and their fellows were taking from the antique in the first half-century. Hence, in the Doria Tursi palace (1564) features are combined which would be

puzzling in Rome—the light, graceful Renaissance arcade and the slender, early form of baluster, and yet a bold and vigorous composition and certain inconsequencies of usage of the traditional elements which are traits of the mature Baroque.

In Rome in the later sixteenth century, architects go their several ways, some conservative and borrowing still from the old source, and others progressive moderns who chose now to give free rein to their own inventive faculties. For all that, there is no great difference of character in the output, whether of conservatives or moderns. The personality of the Renaissance is now so fully achieved—so fully mature—that it will not be denied. It exudes no less from the works of Palladio and Vignola than



FIG. 5—Ducal Palace, Urbino—Sala degli Angeli (Laurana? 1467-82)
(Photo Alinari)
This shows the fundamental form of typical Renaissance vault

from those of Michelangelo, Giacomo della Porta or Domenico Fontana. The first two perhaps are to be regarded as purists, but they are masters of form, and in the superb handling of their designs the independence of the Renaissance is triumphantly demonstrated, no matter in what category, conservative or modern, the complexion of the elevational detail may appear to place them. Palladio's famous Villa Capra at Vicenza, and Vignola's castle at Caprarola, are instances in point. What particular architect or architects were first responsible for the onset of the Baroque it is not really necessary to examine. In varying degree, the work of all the famous architects of the day shows evidences of the emancipation from the

(See page 75)

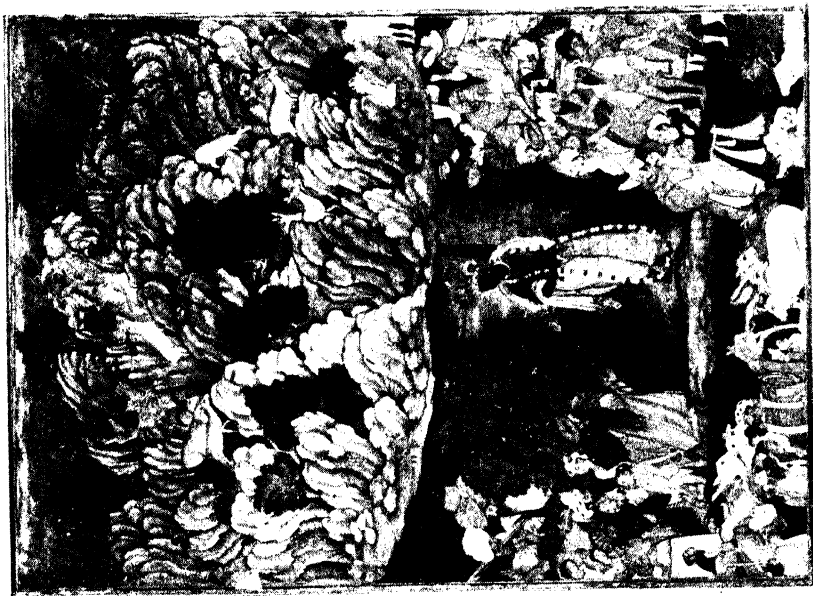


FIG. 2.—Krishna protecting his followers from the wrath of Indra by holding over them the Mountain Govadhan. Mughal miniature from a manuscript of the Razmnama of the period of Akbar, 1556-1605 A.D. Metropolitan Museum, New York.

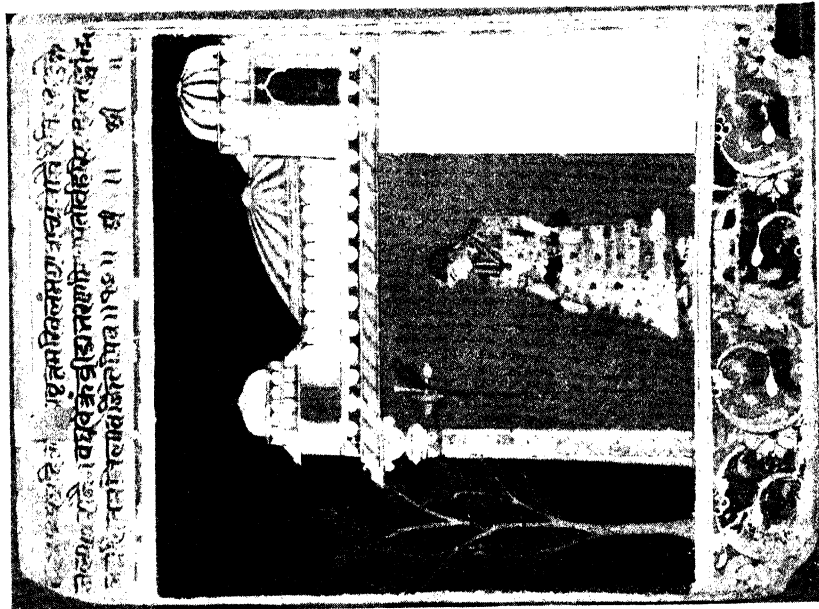


FIG. 1.—Illustration to a poem, perhaps a Ragnala: A girl with a parrot. Rajasthani School, 1680 A.D. Municipal Museum, Allahabad



FIG. 3.—Headless figure of a Yaksha or King, in sandstone, from Patna, Bihar.
About 200 B.C.

Indian Museum, Calcutta



FIG. 4.—*Sandstone figure of the Buddha from Bodhgaya
Early fourth century A.D.
Indian Museum, Calcutta*

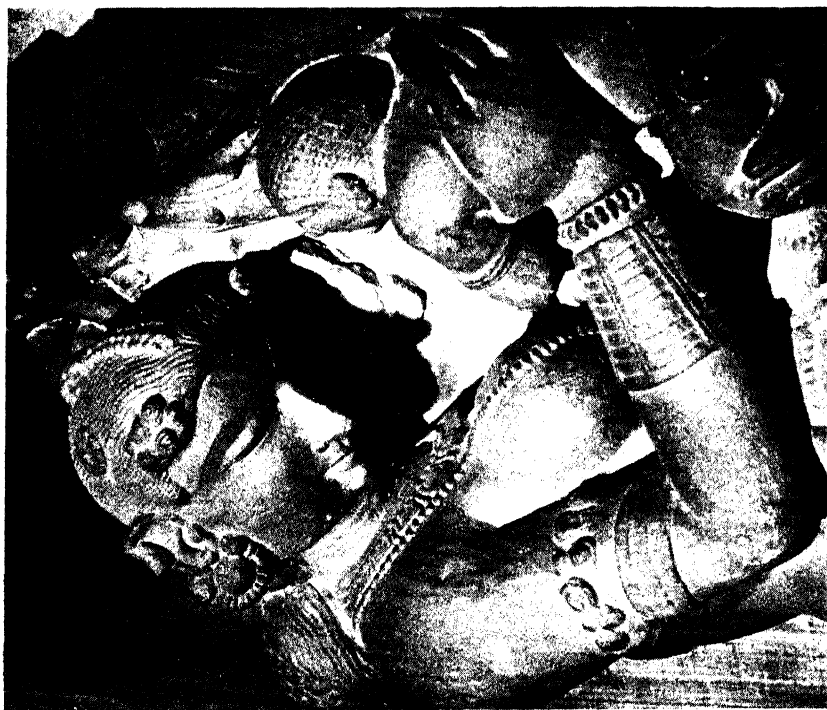


FIG. 6.—Detail from a temple carving in sandstone of a woman and child with vegetation from Bhuvanesar, Orissa
Eleventh century A.D.
Indian Museum, Calcutta



FIG. 5.—Temple pillar of sandstone with decorative carving from Ghazipur, U.P.
Gupta. Fifth century A.D.
Municipal Museum, Allahabad

leading strings of ancient Rome, and a tendency, therefore, towards that character known as Baroque.

Baroque character was fully established by the earlier part of the seventeenth century. It was at its height in mid-century. As the complete individuality of this later phase is universally acknowledged or, at any rate, not disputed, the present purpose is achieved and it is unnecessary to carry the historical sketch further.

For the most part, it is elevational character that has been discussed in the foregoing, since that is the aspect on which the estimation of Renaissance character usually has been based and from which the misinterpretations here dealt with have arisen. The evidence of the ultimate integrity of the style is much more strongly



From an etching by Geoffrey Wedgwood

FIG. 6. —*S. Pietro dei Banchi, Genoa (Lurago, 1581)*
An early instance, in the Renaissance, of the use of twin western towers

afforded, however, by the structural and spatial dispositions, though this is much less easy to demonstrate.

The earlier dispositions in Renaissance church design have been touched upon. The prevalence of the Byzantine-derived domical forms of vault coverings persisted, and developed, together with others proceeding from the remote Roman source. Among the latter was the barrel-vault, semi-circular or elliptical; a most popular type. The great departure in connection with the barrel-vault was the use of "penetrations", i.e., interpenetrations of many lesser vaults into the greater, in an almost infinite variety of ways. The resultant already sufficiently complex shapes provided a basis for geometrical patterning worked in stucco ribs, the panels painted and the ribs lavishly ornamented. Vaults sometimes were framed in timber and formed in stucco; if of masonry they were thin and light. Flat, coffered ceilings in timber were a frequent alternative in churches and palaces alike. There is a consistent progression of development from the outset of these too.

The barrel-vault with penetrations, or the flat timber ceiling, was usual over the naves of churches of latin-cross plan. For the greek-cross plan, the domical covering was almost universal. The vaults dominated the plan and importantly determined the disposition of supports. Mastery of design led to experiments in the interweaving of spatial shapes, as implied by the vaults and supports. The east end of Palladio's Redentore Church at Venice is an early, tentative attempt, wherein the choir is seen through a column screen supporting the apse. More complex is the fully Baroque S. Carlo alle Quattro Fontane (c. 1663) at Rome, where the whole interior has this kind of spatial objective.

The Campanile, at first detached as in medieval times, in the earliest Baroque had become duplicated and a part of the structure itself, appearing as twin towers flanking the western front and framing the central dome soaring beyond. One of the earliest instances is afforded by S. Pietro dei Banchi, at Genoa (1581), the whole a most charming design (by Lurago), and the forerunner of many famous churches of similar dispositions.

These are a few instances of the evidences afforded by structural organisation and arrangement, of the orderly progress of Renaissance development, its fresh and eventual independent character, and the originality of its forms, despite—or because of—the complexity of the early influences upon it, and the undoubted debt to the architecture of ancient Rome.

DISCUSSION

THE CHAIRMAN: I am told that at these Trust lectures it is not usual to have any discussion. It takes a great deal, however, to silence a Chairman and I am sure you would not wish us to part without expressing our thanks for a very thoughtful lecture and the awakened memories which Professor Cordingley's slides have provided for so many of us. In speaking as he did, of course, on originality in Italian Renaissance architecture, I almost wished that he had begun earlier and included the work of Baldassare Peruzzi. The first time I went to Italy I knew quite a lot about the work of various architects but I felt that the work of some of them, particularly the work of Palladio, looked exactly what I expected it to look like. I received very little new enlightenment. The work of Peruzzi may not have been very original, but his two little palaces are most individual. Some people may not be very original but they may be very individual, and Peruzzi's use of elements, mouldings and profiles was, in his day, quite new.

I felt something of the same thing in the New Sacristy of Michelangelo in S. Lorenzo; that while there were no new elements there there was an individual manner which gave me a new impression of the work of this period. In the work there was undoubted originality. The same thing can be said with regard to Brunelleschi; but Brunelleschi did get something from Rome in the way of a study of Roman plans, because after his time Renaissance architecture planning changed from the medieval type of planning. The disposition of the buildings was influenced undoubtedly by Rome and I think that Renaissance architects learned a lot from Roman planning.

I am also wondering how the elaborate details in Baroque, such as the cathedral at Syracuse, were carried out. Did the architects draw full-sized details for the elaboration or was it produced otherwise? I should certainly like to know whether small scale models were used to any great extent.

On your behalf and very much on my own, I offer grateful thanks to Professor Cordingley for the pleasure he has given us this afternoon.

The vote of thanks was carried with acclamation, and after a vote of thanks had been similarly accorded the Chairman, the meeting terminated.

THE ART OF INDIA AND PAKISTAN
 WITH SPECIAL REFERENCE TO THE EXHIBITION AT THE ROYAL
 ACADEMY

By BASIL GRAY, M.A.

Keeper of Oriental Antiquities, British Museum

India and Burma Section, Thursday, December 4th, 1947

Sir FRANK NOYCE, K.C.S.I., *in the Chair*

THE CHAIRMAN: As we have all heard from our youth up, some people are born great, some people achieve greatness and some have greatness thrust upon them. I am in the extremely unfortunate position of having had greatness thrust upon me this afternoon. About five minutes ago I was asked—and, indeed, it was a great honour to be asked—to take the Chair this afternoon in the deeply regretted absence of Lord Wavell, who is unfortunately indisposed and has been forbidden by his doctor to leave the house. It is indeed a very great disappointment to us that he is unable to be here, for we all know how wide his literary and artistic tastes are and I am sure he would have had some most interesting and illuminating comments to make on the lecture we are about to hear. Lord Wavell has asked that his deep apologies should be expressed to the meeting and has said how very disappointed he is that he is unable to be here to-day.

I think that Mr. Basil Gray needs very little introduction to most of you here. He is the Keeper of Oriental Antiquities at the British Museum and we could have no greater authority to address us on the subject he has chosen for his lecture this afternoon.

The following Paper was then read :

Your three societies to whom I am addressing my lecture were the bodies which sponsored or instigated the exhibition which opened last week at the Royal Academy. I am, therefore, going to render to you—though, of course, in no sense officially—an account of the charge which you gave to the organising committee of the exhibition. You had, I must suppose, the conviction that the British public was ready to look with favour and understanding on Indian art, and that an exhibition was not only due, but overdue. I must suppose too, that your members had considered the difficulties of worthily representing the art of such extensive and varied regions through all their long history in a temporary exhibition on the other side of the world. I must confess that I had for years previously viewed with no little apprehension any such attempt being made. For if all that the generations of our men, who had spent their lives in India, had brought back with them and had written about, had failed to win more than a very limited and very grudging recognition of the status of Indian art, how could it be hoped to gather an exhibition which, in a winter's season, could change the traditional scepticism, or, to call it by its true name, ignorance of this art? But your Societies, taking, no doubt, a wider view and informed with a knowledge of what might be done, fortunately persisted, and the task was undertaken.

When the exhibition committee was formed, we realised that there was no chance of success unless we could gain the support of the Government of India—this was, of course, in 1946, long before the coming of independence and partition. That support was promised, and I believe I am right in attributing a great share in that decision to Field-Marshal Earl Wavell who so unfortunately is unable to be

present to-day. A committee was set up in India under the chairmanship of Mrs. Sarojini Naidu, and it is to her more than to any other one person that the representative character of the exhibition is due. The abundance of her energy is astounding, and she is that rare being, a statesman who is also a poet, always confident of the importance of the things of the mind and spirit. She was the moving spirit behind that highly interesting experiment, the Inter-Asia Conference, which was held at Delhi last March, and which was accompanied by two exhibitions, one of modern art and the other concerning the historical connections between Indian art and that of her neighbours. Her confidence and vision heartened the delegation, who went out from London to make the selection, before the formidable task that faced them of covering so huge a field in the short space of eight weeks.

It is not my intention to speak of the intensely interesting, if rather breathless, tour which we made, or of the many who helped us, but I think it should be known that the selection is ours; not, therefore, what India and Pakistan wish to represent them to the West, but what the delegation judged to be the most representative of their art. The standard that we held before us was to admit only objects of art and not documents of archaeology, history or ethnology; and to remember always the august line of exhibitions in whose succession this one follows.

It did not take me long to realise that the material was there in abundance, the level of technique extraordinarily high, and the richness of the schools of sculpture far more prodigal than I had realised—there was a tradition as wide, as developed, and as varied at least as that of pre-Renaissance Europe. And the difficulties of presentation are as great in both cases, and here it is not simply a question of helping the public to leap the gulf of time, but also to understand, to some extent at least, the civilisation whose expression this art is. I feel quite confident of the judgment of artists, of those to whom works of art speak directly by their formal qualities. They will recognise, without possibility of error, the work of a great school. I was lately struck when reading Sir Osbert Sitwell's selections from Walter Sickert's critical writings to find him coupling, in 1912, the names of Greeks and Indians as master sculptors, without self consciousness or fear of contradiction—and this was by reference to the sculptures from Amaravati on the main staircase of the British Museum, passed every day by hundreds of people. Sickert in the passage speaks of a sense of "building up" which the spectator has before good sculpture, of its fullness of content. I had myself thought of the formal exuberance, an exuberance not of multiplication of detail but of fullness of form, bursting as it were through the crust of stone. This is achieved not by violent action or by exaggerated naturalism, but on the contrary through simplification, conventionalisation of drapery and a mastery of the material which throughout the school is astonishing, even in the hard granites and basalts.

In drawing, too, the Indian tradition is very sound. In each section of the exhibition devoted to painting there are examples of fine draughtsmanship which show complete technical competence. The ordinary instrument of the draughtsman was a very fine brush and the line was habitually used to de-limit form. Whether in wall-painting or painting on paper it was usual to work on a prepared ground, and correction was rarely necessary. Once again, the artist is master of his medium. What is he seeking to express with it? Take the exquisite drawing of the milkmaids

in an arbour—here is evidently a mood of lyrical freshness; we may perhaps be reminded of Puvis de Chavannes. But I do not think this Indian drawing is to be considered as a modern work of sensibility, though it is probably no earlier than the eighteenth century. This is the authentic work of an age of faith, where tradition meant a way of living, as well as a way of painting. For parallel I shall look to the early Greek with its same felicity of simple vital rhythm, but the natural world is more intimately felt in the Indian drawing. This is an unusual drawing of a rare school; generally the artist is more interested in composing in depth and his drawing is clearly waiting to be completed in colour.

Appreciation in the visual arts has been so greatly widened in the West in the last generation that it is no longer difficult to appreciate work done in accordance with quite different conventions. We do not expect to bring the *same* sensibility to an oriental painting as to a modern European or a Renaissance painting. We do not expect to find all painters interested in the mosaic of surface appearance or in a formal system of mass built up on chiaroscuro. We know of several systems of perspective and have learnt that it is necessary to go some of the way to meet a painter in order to see what it is he is trying to do.

It is as well first to realise the historical and economic conditions which produced the kinds of painting which are shown at the Royal Academy. Every educated person knows that India had a classic school of painting, has heard of Ajanta, and is more or less aware of the period, from the first to the sixth century A.D., of the paintings in the cave shrines and monasteries. But the partnership of painting with architecture and sculpture did not stop there. There was as continuous a tradition of painting as in Gothic Europe. It was when the big Hindu kingdoms fell before the Muhammadan invaders and patronage was limited, that painters were restricted to pictures on palm leaf manuscripts and on cotton cloth. The medieval schools of both Eastern India (Pala) and the West (Gujrata) show a decline after 1200 in the East and after 1350 in the West; they were becoming more and more stereotyped. But a new movement was about to sweep over the country, the great Hindu revival, popular and making use of the vernacular speech of the people, a religious movement mainly Vaishnavite, which manifested itself above all in poetry and music, but also in dancing and painting.

It is the later fruit of this movement which, for the most part, fills the two galleries at the exhibition devoted to Rajput painting. Unless it is realised how familiar were the choice of subjects treated, how the love songs of the *Gita govinda* were on everyone's lips and the various Raga modes taught to everyone, the essential character of this art and its passionate account cannot be fully appreciated. Only then will it be possible to see how great are the varieties of treating the same themes; how the sophisticated science of the Rajasthani school had developed a colour technique as intellectual as the Sienese for the treatment of Ragmalas (Fig. 1, p. 69) how the simple court painter of the remote Basohli state concentrated all his skill on the evocation of each movement of love in his Mayika or heroine types. He will see the same universal sentiment more romantically and individually treated by the artists of the Kangra school.

And what, you will say, of Mughal painting? Is this something wholly different, alien to India and a more exotic growth fostered in the artificial conditions of an

alien court? I think not. The Mughal house, in its earlier rulers, and above all in Akbar, had an acute sense of the genius of India. He borrowed and developed her architecture and patronised her great musicians and poets; he studied her epics and her religion; and he adopted her land tenure and respected her military skill. He tried to build a great united Indian culture, and he nearly succeeded. If you can trust me, I assure you that after the third quarter of the sixteenth century the Mughal style of painting was already so formed that I have never seen a drawing about which there could be any reasonable doubt as to its being executed in Persia or India. After all we should know, for the history of painting in our own country shows how immediately an alien artist's work is modified to suit the taste of his new patrons. And in India Akbar tells us that he found a vigorous school, which only needed Imperial patronage to produce great monuments like the Jaipur *Rāsmānma* and the several more on view at Burlington House (Fig. 2, p. 69).

To return to the sculpture. I have said that I feel no doubt about the verdict of artists, of the man or woman who is interested in technique or the solution of formal problems. But we all know that most people are interested, broadly speaking, in the subject of a work of art, that is, what the artist was seeking to express, and on this side the general public undoubtedly needs help and guidance. I hope that members of your Societies are anxious to see this enterprise, which you have set on foot, carried through to fulfilment, and that you will help with your varied experiences of eastern life and civilisation to relate the microcosm, which we have tried to present at Burlington House, to your whole art and civilisation.

I shall try, in what follows, to give some clues which I have myself found helpful in gaining a perspective. It is only after a general picture is formed that it is possible for the majority to gain clearer insight and understanding. Leaving aside the small sculpture of the ancient Indus Valley civilisation, as being incomparably more remote than anything else in the exhibition—fascinating in its strangeness, its part in the ancient world, and its mixture of heartlessness with refinement—and passing on many centuries to the Mauryan age, our public will find a school which is probably more easily comprehensible than any which follows. Of all sculpture we are shamefully ignorant, but the monumental style is that least ignored. Consequently the Bull capital rightly first meets the eye of the visitor as he mounts the stairs; it is a masterpiece of monumental sculpture, conveying, as it does, an impression of naturalism, of the ideal Bull type expressed with great economy. We are ignorant of the significance of this symbol placed by Asoka on the top of a forty-foot column in the open at Rampurva, bearing one of the texts of his famous edict and near another pillar crowned by a lion. None the less it serves us as an admirable symbol of the great enlightened despot. The other outstanding monumental figure is the headless Yaksha of a King in Gallery I (Fig. 3, p. 70). This weighty figure with its heavy, simple drapery has the regal air of the King as judge, impersonal and representative of order and justice. Very different in feeling is the torso, not in the exhibition, of Kanishka, the Kushan King (2nd century A.D.) with its masterful stance and more individual treatment of the robes. We have passed from an art, akin to that of the Hittites or of Egypt, to one nearer to archaic Greece.

Not that the monumental is altogether lacking from Kushan sculpture. There are several figures of Bodhisattvas in the typical Mathura stone, of which one is

exhibited in the Great Gallery in Burlington House, and which retain something of this monumental quality. And, indeed, it is by no means absent from the Seated Buddha (Fig. 4, p. 71) on the opposing wall, which is almost certainly from the very early fourth century A.D. just before the beginning of the Gupta period. But this figure, which is undoubtedly one of the masterpieces of Indian sculpture, is informed with an entirely new spirit. Weight and gravity are here, and still the simplified folds and formalised hair which belong to an early stage in a civilisation like that of sixth century Greece, but behind is the transcendental spirit of a faith which taught of tranquillity above the accidents of the transitory world.

But we must retrace our steps to glance at the earlier narrative art of Buddhism, as shown in the great series of sculptures from the major pilgrimage centres of Bharhut, Sanchi and Bodhgaya and the rich southern shrine of Amaravati. With this sort of carving, in which the main incidents in the life of Gautama Buddha were constantly repeated, we are familiar in medieval Christian art. We have the same plain and economical treatment of the salient facts and the same joyful spirit in scenes where the heavenly and the earthly touch. Compare the heavenly beings who bear the relics of the Buddha or the heiratic following of the "Ride forth from Kapilavastu" with the representations of the "Last Judgment" or "Palm Sunday". There are, of course, great differences. This Buddhist art of the two centuries B.C. and A.D. was carved upon the simplest architectural members, upright and cross pieces of a stone fence, imitating exactly a wooden form of construction, or upon the casing of the stupas themselves. Consequently the decoration is concentrated at the crossing or in friezes, and the shapes are either roundels or strips, occasionally in spandrels. On the other hand, the compositions are more dynamic than in the early medieval art of Europe, and at Amaravati reach an astonishing level of inspired composition.

It is, nevertheless, the Gupta age (A.D. 320-590) which is regarded as the classic period of Indian sculpture in the sense that it sets the line for the subsequent development. And here we meet the two elements which constitute the main achievement of Indian sculpture: the first the presentation of cosmic themes through anthropomorphic art, and the second the enrichment of architecture with decoration and sculpture unrivalled for freedom and vitality in any other school of the world. This decoration, based on plant forms, and bird, animal and dwarf motives (Fig. 5, p. 72) has the swing and finish of the best Roman decoration, like the Ara Pacis, and is capable of the same big scale, as, for instance, in the great frieze round the stupa at Sarnath; but it also gives an extraordinary sense of profusion and, consequently, of vitality. And this is one of the marks of mature Indian sculpture. The cycle of birth and decay, of time and infinity, and the impression of form upon matter are the great themes which inspire the sculptors' representation of the Hindu pantheon. And the Buddhist figures also are abstractions representing cosmic forces—of charity, pity, or the wisdom of contemplation. We are used to representations of superhuman figures, the over-life-size prophets and Apostles of Chartres, but they are not so abstract as these Hindu representations, to which nothing so much attributes as the whole tension of body and, above all, the expressive gestures of the hands. We are not, of course, without experience of an art based upon the human body; indeed, all Post-Renaissance sculpture in the West has made it

a central theme. But how academic and mannered all this looks beside the natural grace which seems the native idiom of the Indian sculptor! Partly this is due, no doubt, to his greater familiarity with the bare human body, but even more the difference must lie in the more serious and less artificial aim of his art. No man is so free as when he is working inside well-recognised conventions.

The Gupta age saw the foundation of this mature school, but, for me at least, its finest flowering came a little later in the "Medieval" period, from the early seventh to the eleventh century. This period opens with the rock-cut cave-temples at Ellora and closes with the voluptuous carvings of Bhuvaneshwar and Khajuraho. With the alphabet of his art firmly established, the sculptor could venture on extremely developed and complex compositions, and delighted especially in the torsion of the human body and the succulence of plant-forms. The greater compositions cannot unfortunately be shown in an exhibition; but at Burlington House in Gallery IV are some admirable examples of smaller carvings (Fig. 6, p. 72). These remind one in their virtuosity of the work of Agostino di Duccio, but it must be remembered that they are only fragments from great series covering whole temples. Such a body of work can only be carried out under a system of workshop organisation and institutional support, such as we experienced in our own Middle Ages. And so we return to the point at which we started: the "medieval" character of all post-classical Indian art. Under it the sculptor was a member of the household of a King or an institution. He may have travelled just as his fellow did in Europe, but he had an assured place as a member of a recognised craft. When large-scale temple building ceased, the painter carried on the medieval tradition, working for a patron, a Raja or a landowner, who supported him in the usual way with a grant of land. We know the names of several painters and it is probable that most of the series, which have now unfortunately disappeared, originally had colophons in which names of artists and patrons were both given.

There is such a wealth of material in the fifteen galleries at Burlington House that we are bound to be a little dazed at first, but as we explore more and more we are bound to be conscious of the extraordinary generosity of the institutions and lenders in the two Dominions who have allowed their finest, and their rarest, pieces to travel across the seas and spared them for nearly a year in all in order to give us the chance to enjoy them during these three winter months. At none of the exhibitions preceding this winter's at the Royal Academy has nearly so large a proportion of the exhibits been provided by their country of origin, and we owe them a deep debt of gratitude for this unique opportunity, which we should be foolish not to use to the full, for studying one of the great arts of the world. We may, indeed, claim for our scholars that they have done good work on the archæological side in revealing and conserving so much of India's past, and I should like to commend to those of you who do not know it the story of the Archæological Survey of India, in a volume edited by Sir John Cumming for the India Society which was published in 1938. But now the time has come when we need more interpretations of this art and its background, and for this we look with confidence to the writers of the two Dominions. Dr. Coomaraswamy, whom we had hoped to welcome to London this winter, but whose death we have now to mourn, has made a distinguished start, but the field is wide and the need for mutual understanding great. May this exhibition open our eyes to the qualities of a great civilisation.

DISCUSSION

After two questions had been answered very briefly by the lecturer,

THE CHAIRMAN said: I must confess to a feeling of disappointment that this discussion has been so brief. I take it that that is really a great compliment to our lecturer; he has covered the ground so well that there is nothing to add. That, at any rate, is my own feeling.

I am quite sure that his lecture will send those of us, who have already seen the Exhibition, back to it to see it again from a new angle of vision, and make those, who have not yet been to see it, hasten to do so. Mr. Gray has dealt almost entirely with sculpture and painting. I could have wished that he had told us a little more about what I think is one of the most attractive features of the Exhibition, the exhibits from Harappa and Mohenjo-Daro, as this is the first opportunity the public in this country has had of making acquaintance with the treasures excavated from those two centres of ancient civilisation. Some of us from India knew them fairly well, but there are many to whom they are new, as they are the discoveries of such a recent period. They show—and it is, I think, a matter for great regret—how little taste and workmanship in jewellery and personal adornments have improved in the course of the last five thousand years.

I would like to thank Mr. Gray on my own and your behalf for his most illuminating lecture, and for the very attractive slides he has shown us, and I think we should also thank the three societies, the Royal Society of Arts, the Royal India Society and the Royal Asiatic Society for promoting this joint lecture. It is a very happy example of tripartite co-operation, as, indeed, is the Exhibition itself of the co-operation between the Governments of two Dominions and the Government of this country. Those of us who have known and loved India will hope that that spirit of co-operation will become ever more apparent in other and wider fields.

The vote of thanks was carried with acclamation, and the meeting then terminated.

OBITUARY

LORD PHILLIMORE.—We regret to announce the death, on November 28th, at Cape Town, of Lord Phillimore, who had been a Fellow of the Society since 1937 and a member of Council in that year.

The second Baron Phillimore will chiefly be remembered for his book, published in 1930, "Recollections of a Prisoner of War". He had served in the Highland Light Infantry and in 1916 was reported missing but was found subsequently to have been taken prisoner. The book was a great success.

SAMUEL COURTAULD.—It is with regret that we have to announce the death of Mr. S. Courtauld, LL.D., J.P., D.L., for 25 years Chairman of Courtaulds Limited until his retirement last year, and a great patron of art and culture. He had been a life Fellow of the Society since 1934.

Samuel Courtauld was born at Bocking in Essex in 1876 and was educated at Rugby. At the age of 20 he joined the family business. In 1904 the business bought the British rights to manufacture rayon by the viscose process, and on this as a basis it grew to be one of the largest textile undertakings in the world, having expanded to the United States in 1909. Courtauld became Chairman in 1921, and after this he was able to indulge in his ambition to foster European culture. His bequest to the Tate Gallery for the purchase of the works of certain modern painters and his wife's foundation of the Courtauld-Sargent concerts were the best-known examples of his munificence, but the full range of his activities was far wider. He will be mourned, in the words of *The Times*, as "a great citizen".

SIR REGINALD STUBBS.—We regret to announce the death of Sir Reginald Edward Stubbs, G.C.M.G., M.A., LL.D., who was elected a life Fellow of the Society in 1936, and was a member of Council in 1940. Sir Reginald was born in 1876 and was educated at Radley and Oxford. In 1900 he started his long and distinguished career in the Colonial Service, rising to become Governor successively of Hong Kong, Jamaica, Cyprus and Ceylon.

GENERAL NOTES

THE R.B.A. WINTER EXHIBITION.—Inevitably overshadowed though it is by the great rival Exhibition at Burlington House, the winter display of works by members of the Royal Society of British Artists is an event in the Art world, and should not be overlooked. Over four hundred oils, water-colours and drawings remain on view in the Society's six galleries in Suffolk Street until January 17th.

In a foreword to the catalogue, the President, Mr. John Copley, is at pains to explain the Society's title as well as its aims; but those of us who have visited the R.B.A. Exhibitions for years past know that their prevailing tone is conservation, and that daring experiment, if not discouraged, is rarely evident on the walls. The list of prominent members who exhibit this year—John Cole, R. O. Dunlop, Ethel Gabain, P. H. Padwick, Stephen Spurrier and Ethel Walker are among the principal contributors—sufficiently indicates the nature of the majority of paintings, which might have hung with perfect propriety in the N.E.A.C. Exhibition, or in any half-dozen rooms of the Academy this summer, so closely inter-related have these old established Societies become.

In the present Exhibition, P. H. Padwick's classical composition "Anglers by the River", with a group of feathery trees in the right foreground and a distant prospect of hills and gleaming water, is a work of great distinction and perhaps his finest achievement; and elsewhere Harry Rutherford's subtly harmonised painting "A Rainy Day", Stephen Spurrier's satirical conversation-piece "Junk" (which possesses something of Tonks's sense of the grotesque) and Ethel Gabain's delicious "Green Coffee Cup" are works of charm and refinement. Among the water-colours I would single out for special attention the beautifully composed study of Hastings by F. Coulson-Davis (a distinguished newcomer to the R.B.A. Exhibition), P. W. Cole's admirable "Shipyard, Rye", and two exquisite contributions by Arthur E. Davies, drawn in dark sepia enhanced by limpid washes of colour.

N. A. D. WALLIS.

LUTYENS MEMORIAL FUND.—Sir Edwin Lutyens died on New Year's day 1944. He had been for 40 years a Fellow of the Royal Society of Arts, during which time he had taken an active interest in the Society's work and had been a member of Council from 1930-34.

Shortly after Sir Edwin's death a fund was opened to enable four volumes, commemorating his life work, by Christopher Hussey and A. S. G. Butler, to be prepared. These will be ready early in the New Year. It is also hoped to use this fund to endow an Annual Scholarship at the Royal Academy School of Architecture. A contribution of more than one guinea enables subscribers to purchase the handsome memorial volumes at a discount of 25 per cent. of their published price of 25 guineas. This concession will, however, cease on 31st March, 1948. Donations will be gratefully received by the Honorary Treasurer, Viscount Esher, at the office of the Lutyens Memorial, 13 Mansfield Street, London, W.1.

CORRESPONDENCE

THE INFLUENCE OF WILLIAM MORRIS

In a memorable lecture, Mr. John Farleigh has paid tribute, as fitting as it is unfashionable, to the small, but potent, body of craftsmen who have kept alive the spark that was kindled by William Morris in the dark ages of English art. More obviously, perhaps, than most great reformers, Morris owed his practical success to the fact that he was a poet. A shrewd knowledge of men and a capacity, even rarer than now, for seeing things as they are were the chief ingredients of an epic equipment whose impact on art was universal and which in England, as well as in Scandinavia, has proved to be enduring in its consequences.

P. A. RICE.

NOTES ON BOOKS

AN INTRODUCTION TO STUART DRAMA. By Frederick S. Boas. Oxford Press. 15s.

In his delicious account of his visit to No. 2 The Pines, Max Beerbohm observes that Swinburne "could as soon have imagined a man not loving the very sea as not doting on the aspect of babies and not reading at least one play by an Elizabethan or Jacobean dramatist every day"; whence it may be inferred that Dr. Boas would have been a man after the poet's own heart. That Swinburne was indebted to the tireless researches of that great Shakespearean scholar of his day, A. H. Bullen, we may surmise also; and indeed Bullen's *Old English Plays*, published some sixty years ago, remain a model of acute identification and are alluded to more than once in the scholarly text under review.

Since Bullen there have, of course, been several distinguished commentators on the Elizabethan stage, but of this number, so far as I am aware, only Professor G. B. Harrison has aimed to popularize the period, and guide the layman through that romantic maze which Max has confessed to finding an "impenetrable jungle."

Dr. Boas's *Introduction to Stuart Drama*, which completes a trilogy begun nearly twenty years ago with an *Introduction to the Reading of Shakespeare* and followed by an *Introduction to Tudor Drama*, is intended for those who are interested in Stuart drama without professing to scholarship, and it is most unlikely that these authoritative pages will appeal to the wider circle of readers who have been attracted by Professor Harrison's writings. "On the other hand, I think that the attention concentrated on the relation of *Satiromastix*, published in 1602, to the *poetomachia* . . . has obscured the interest of the main plot of this play on which the controversial features appear to have been grafted." That is hardly a sentence calculated to make the ordinary reader clamour for a cheap edition of Dekker's plays, and Dr. Boas will reply very reasonably that it is not intended to be.

His task has been to collect the scattered fruits of recent research—research that has engaged the attention of scholars on both sides of the Atlantic and has led, in his words, to a "marked change in our critical perspective" in appreciating some of the

principal dramatists whose work falls between the accession of James I and the Restoration; and it may be added that no more experienced editor could be found to sift and collate these labours.

In outlining the phases of Stuart drama, the author regards 1613—about the date when the dramatic activities of Shakespeare and of Beaumont ended—as the close of the great Elizabethan period, and 1636 as the end of the Jacobean flowering which produced notable works by Massinger and Middleton and the later plays of Ben Jonson. The period has not been presented as a decline from the Tudor apex, however; indeed, "The more deeply the record is studied," says the author, "the less ready shall we be to speak of any part of it in terms of decline or of decadence. As the years pass, the aspects change and the values vary. But we are conscious throughout that not only the leading but the lesser figures have their share of the authentic fire from the altar."

No better example could be given of Dr. Boas's unobtrusive scholarship, and his acute and impartial examination of the available evidence, than his critical survey of the plays attributed to Beaumont and Fletcher—that famous collaboration at one time credited with more than fifty plays. Though it has been proved that many of the plays formerly included in the *corpus* were written after Beaumont's death—and, in fact, the hands of Massinger and other dramatists have been recognised in four-fifths of the group—we are still left with some ten plays, which include the masterpieces of the collection produced, in Dr. Boas's phrase, by "the classic example of Stuart dramatic partnership."

Most impressive of all, perhaps, to the unscholarly reader is the author's profound knowledge of the idiosyncrasies of style which characterise and differentiate the blank verse of these old dramatists; and one can picture A. H. Bullen's bearded Elizabethan countenance lighting up in appreciation of a rare insight that was his also, and his pre-eminently.

Tragedies of revenge and of melancholy, comedies and satires, masques and entertainments—these dusty folios and the inscrutable minds that conceived them three centuries ago are here appraised by one of the finest scholars in the world of letters.

N. A. D. W.

DRAUGHTSMANSHIP. By R. Fraser Reekie.

Edward Arnold & Co. 1946. 10s. 6d.

The author of this useful handbook is an architect and teacher of repute. His purpose has been to describe the technique of draughtsmanship and the methods of preparing drawings used in connection with the layout, design and construction of buildings, and the result is a little book full of excellent diagrams in line and tone which should be of the greatest value to the young student.

No one, as Mr. Reekie observes, can learn to draw by reading a book; but the beginner will discover how to set about his task, what materials to acquire, and other practical guidance in these pages expressed with the conciseness of an experienced teacher.

After giving advice in the selection, use and care of drawing instruments and materials, the author goes on to discuss line drawing in the simplest terms. "It is wise," he insists "on setting out to make a serious study of draughtsmanship, to forget any previous idea of drawing, and to start as if pencil and paper had never been handled before," and the student is given his first lesson in handling a pencil and T-square. The process of inking-in, geometrical drawing, and the principle of orthographical projection (the method of showing three-dimensional objects in two-dimensional drawings) are briefly but effectively described and illustrated in this chapter.

Little progress can be made in draughtsmanship without attention being paid to lettering, and the author rightly stresses the first importance of legibility. The Roman alphabet will always be the basis of good lettering, and precise instructions are given in the construction of Roman lettering before the character and suitability of other types are considered.

The principles of scale drawing, and the notes on the various conventional methods of indicating details and representing materials on architectural drawings, take the student a stride forward in his understanding of the complexities of his profession, and these pages with their clear diagrams will be found particularly helpful for reference. A student's drawing in this section of *Maids of Honour Row*, Richmond, is a model of delicacy and precision which the youthful beginner should emulate.

An insight into the problems of perspective

drawing is given in a concise chapter on Projections, and various methods of "rendering" designs in water-colour, and other media are described and illustrated so far as the limitations of monochrome reproduction permit. One of the illustrations, an indian ink drawing of a temple, charms the eye by virtue of its freedom and absence of meticulous detail—an inevitable, but sometimes worrying, characteristic of architectural designs.

The ability to make freehand sketches simply and quickly is of value to anyone and almost essential to those for whom this book is designed, and in the final chapter some simple exercises in the art are set for practice. This admirably arranged little book will no doubt be in demand for years, and when it is reprinted a mistake in a "running head" (p. 197) should be noted.

N. A. D. W.

PIETER BRUEGEL: THE DULLE GRIET, in the Mayer Van Den Bergh Museum, Antwerp. With an Introduction by Leo Van Puyvelde and 20 illustrations. The Gallery Books, No. 10. Percy Lund Humphries & Co. 1946. 4s. 6d.

The writer of the essay on this strange picture arranges his paper under four heads: 1. The Meaning of the picture; 2. The Interpretation; 3. The Style; and 4. The Picture—this fourth section containing its history.

Under the first head he explains that the name Griet is the equivalent of the French Margot and the English Meg, and the name was associated with a type of harridan who was "loose, evil-tongued and overbearing" and who "having thrown off the male yoke, here challenges . . . the Devil himself." The second section dissects the whole complex of the composition and explains its symbolism and its possible message. The third deals with the painter's technique.

Pieter Bruegel the Droll was a pupil, and later the son-in-law, of Peter Coucke, an engraver, painter, sculptor and architect, and by his training under this master he became a careful and accurate draughtsman. Later, as a painter he showed a fine sense of colour. Although he painted many pictures of sacred subjects and scenes of contemporary

rustic life, he seems to have taken a delight in depicting the weird and fantastic images inspired by old stories of witchcraft, using this material in composing pictures satirizing evils of his own day, but often, as the laughing moralist, with a humorous twist prompted by his evident delight in the invention of fantastic creatures. The inclination to construct verbally or graphically, zoomorphic monstrosities dates from the age of pre-historic pottery and the early glyptic art, and continues to-day. Such composite creatures may have queer spiritual meaning, or may be amusing, or as with our friend Picasso, just morbid and incoherent. Among the numberless conceits from Crete, Greece, Egypt, Persia, Scythia and almost everywhere, it may be also remembered that in the army of demons, sent by Mara to destroy Gotama Buddha, were creatures with animal heads on human bodies and others with their heads where their bellies should be. Although Pieter Bruegel had thus endless records to draw upon, he has succeeded in adding to the types, and generally with a spice of humour not always savoury.

There is no record of the painter's interpretation of this extraordinary picture. Yet it seems evident that he had, at least when he commenced it, some message to convey; and as the writer suggests, the evils of intemperance may have been the main theme. As to composition, confusion seems to have taken control. Beyond the central motive the work appears to develop by fortuitous accretion of periodic whims; and having embarked on the creation of monstrous creatures, whatever their symbolism, the artist gave his gruesome humour free play. In the unequal quality of execution running throughout, there is evidence that grotesqueries were hastily drawn in from time to time as fresh conceits occurred to his fertile brain. Perhaps he kept the picture in his studio for a long time as a sort of depository of whimsicalities, and one can imagine how, with a mischievous

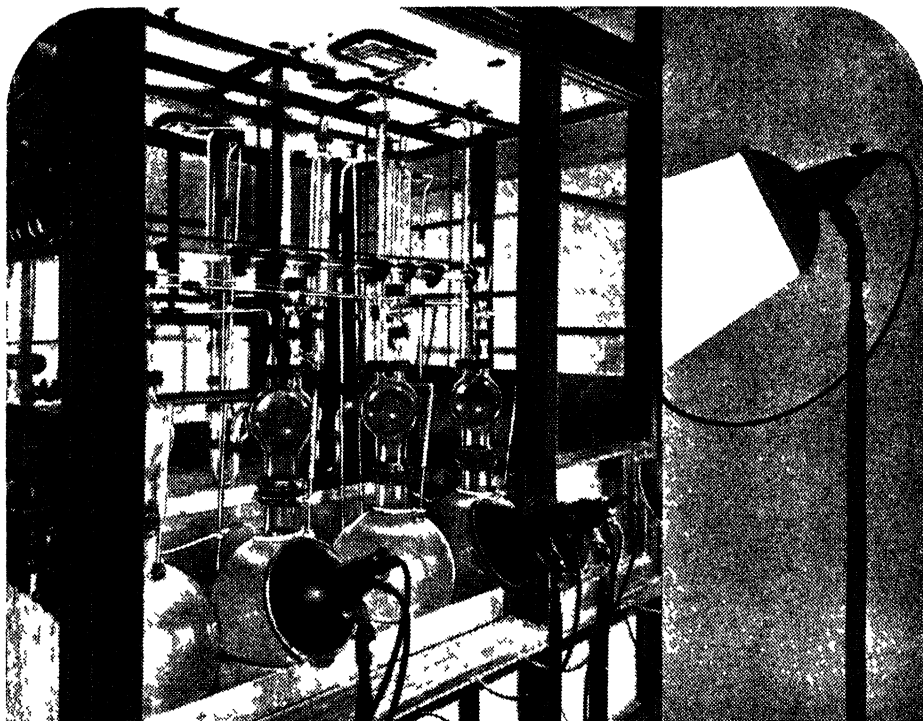
chuckle, some new item of increasingly extravagant aspect was added, until the limits of the canvas could carry no more.

Tremendous energy is expressed in the finely drawn, gaunt, striding, virago, as laden with basket and bundle containing kitchen utensils and other household treasures and armed with casque, cuirass, a single gauntlet and a straight sword, she leaves the citadel where the women in revolt are taking vigorous and successful action against hordes of repulsive demons who pervade land, water and air. The haggard creature, intent on her mad mission, whatever it may be, expresses by her wide, staring eye, her open wizened mouth and rapid movement, the fixed purpose of a fanatic. As she advances, imps and monsters scatter in panic, seeking shelter in the yawning jaws of hell or diving into the noisome liquid stream that moat-like skirts the foot of the citadel walls and flows into hell's cavernous mouth. The jaws of hell, as we know, figure in mediæval ecclesiastical art and in the Tantric drawings of Tibet and Central Asia, all illumined by terrifying flames and staffed with competent leaping demons busily dealing with erring human souls. But while these sacred horrors were meant to terrify and warn, Bruegel's hell seems to express mild surprise and some anxiety respecting the effect and disposition of the mixed dose he is expected to swallow.

In his "Interpretation" of the picture the writer, who has given much critical study to the work, directs attention to many interesting incidents and grotesque creations, well illustrated on an enlarged scale.

The reproductions are admirable and the subject is extremely interesting. The only regret one feels is that we could not have a faithful reproduction in colour of the whole picture. But perhaps in time it may be possible to extend to this very valuable series, the advantages of at least one example of colour in each book.

F. H. A.



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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4759

FRIDAY, JANUARY 2nd, 1948

Vol. xcvi

MEETINGS OF THE SOCIETY

The following meetings will take place within the next fortnight:—

WEDNESDAY, JANUARY 7TH, at 2.30 p.m.—The second of the *Dr. Mann Juvenile Lectures*—"WHAT WE DO WITH OUR COAL". By W. Idris Jones, B.Sc., PH.D., Director-General of Research, National Coal Board. (With demonstrations.) The arrangements for these lectures were notified in the last two issues of the *Journal* and admission is by ticket only. At the time of going to press, a few tickets are still available.

THURSDAY, JANUARY 8TH, at 2.30 p.m. India and Burma Section (*Sir George Birdwood Memorial Lecture*). "THE GROWTH OF THE PRESS IN ENGLISH IN INDIA", by Sir Alfred H. Watson. Colonel The Hon. J. J. Astor, General Manager of The Times Publishing Company, will preside.

WEDNESDAY, JANUARY 14TH, at 2.30 p.m.—"TOYNBEE HALL AND THE UNIVERSITY SETTLEMENTS", by Major Lionel F. Ellis, C.V.O., C.B.E., D.S.O., M.C., Associate Warden, Toynbee Hall. The Right Hon. Sir John Anderson, G.C.B., G.C.S.I., G.C.I.E., F.R.S., M.P. will preside.

AUSTRALIAN ART

By COLIN COLAHAN

Dominions and Colonies Section, Tuesday, December 16th, 1947

The Right Hon. Viscount BRUCE of Melbourne, P.C., C.H., F.R.S., *in the Chair*

THE CHAIRMAN: It is my great privilege to introduce Mr. Colahan who is going to speak to you this afternoon. If you knew me, you would be as surprised as I am to find myself presiding at an art lecture. You do not know the answer, but I do! Towards the latter days of the war, Mr. Colahan held an exhibition in one of the art galleries in Bond Street and I was invited, as the official representative of Australia, to preside at the opening ceremony. I felt it was my bounden duty as the representative of Australia, to rally to the support of this Australian. I did it with terror and trepidation and, feeling so apprehensive, I sought Mr. Colahan's aid. I found him and asked him what one said when opening an art exhibition. I wanted to know the technique. He was very unresponsive and gave me not the slightest help, but we walked round the gallery and looked at the pictures. Even to a person like myself, whose soul was dead and who did not appreciate what art was, those pictures meant something. I did not ask Mr. Colahan again what I ought to say; I knew for myself. The exhibition was of

two types of picture, one of which was almost entirely representations of London during the "blitz". Even I could see that what Mr. Colahan had done was quite remarkable because none of us had seen the lights and colours that existed during the period of the war when there were no glaring lights in the streets. At that time there were new colours and new tones which, though I had seen them, I had not understood before.

The other pictures were impressions of scenes in the battlefields of Normandy and even to me they spoke as nothing had ever spoken before. I was so impressed that when I was invited to preside to-day, whilst recognising all my limitations and lack of qualifications to do so, I accepted enthusiastically.

Mr. Colahan is going to speak to you about art in Australia. I have searched my mind to see what I could possibly say I had contributed to Australian art. As a result of my labours I found that I have made two spirited efforts, both of which failed. The first was when I was Prime Minister of Australia. When the new Federal capital was established in Canberra, I was the first Prime Minister to live in the Prime Minister's lodge. Prime Ministers used to send out official Christmas cards every year in hundreds of thousands such as in these days of paper shortage one can hardly conceive. My idea was that since this was to be the initiation of the capital, it would be delightful if, on the walls of the official residence, we could have good examples of the art of the particular year. For the three years that I lasted until I was ignominiously defeated and driven out of office, we sought out the artist of the day and asked him to paint us something for Christmas cards. They all responded in a delightful manner and the Prime Minister's Christmas card for the first three years was an example of the art of Australia in its best sense at that time. When I was turned out of office they said "Oh, that is only one of his stupid ideas" and the practice was not continued. But by then we were beginning to collect something worth while for the Prime Minister's residence.

My other effort concerned the official records of Australia. Out there we have the idea that a painting of the Governor-General, the Prime Minister, the President of the Senate and the Speaker of the House of Representatives, painted by an artist of the period, should go into the historical records of Australia. Unfortunately, in Australia we also have the idea that all good things should be parcelled out to all the contestants and consequently the four paintings are done by four different artists. I suppose a miracle could happen and that it would be possible to have four first-class portrait painters at the same time, but it is a little unlikely. Once, when I saw paintings of the Archbishops of Canterbury, I discovered that here in England they had a little more intelligence. They did not parcel the work out but selected the portrait painter of the day who in his time might paint several Archbishops of Canterbury. I tried to change the system in Australia but once more I was ignominiously defeated and we still parcel the work out.

I have struggled to associate myself with art in some way and that is the best I can do. I am sure that we shall all be most interested to hear what Mr. Colahan is going to say to us to-day and I now call upon him to address you.

The following paper was then read:

In sketching the history of the development of art in Australia I shall begin with the painters of early settler days. I shall not, until later in this paper, touch on the subject of the native cave paintings, chiefly because the appreciation of these is of quite recent date and their influence, if any, will be apparent only in the contemporary or future development of Australian painting.

The first painters in Australia were simply transplanted Europeans (the names do not matter and indeed, as far as it is possible throughout this paper I shall avoid names, for to give them would be merely to make a catalogue which would be

forgotten immediately). These early painters, faithful to their training, painted the Australian scene as though it were a part of Surrey or the Lake District.

To appreciate this monstrous obtuseness you must realise that the Australian landscape is like nowhere else on earth. In most hot climates colour blazes in the blazing light, but Australian light bleaches. There you find neither tropical greens nor the lush colour of England but the slightly drab khaki green of the ever present gum tree or eucalyptus. And except for a moment in spring, green grass is a rarity, or a carefully cultivated and endlessly watered luxury of the cities. Bleached yellow and khaki, blue and mauve grey, and strident stripes of shadow and blazing light replace the gentler harmonies of England, and instead of the rounded and flowing tree forms that you know so well here, the gauntly majestic and sparse-leaved gum—as gaunt as naked oaks in winter, but bleached and smooth. And a white throbbing heat mist replaces the suave blue mists of England. This was the landscape that these early painters decorously converted into smooth Surrey Downs. One compares their demure paintings with the burning excitement of the canvases of Van Gogh faced suddenly with the light of Provence—but then Van Gogh was a painter of genius, and the Australian landscape had to wait some time for its eyes of genius. The succession of transplanted European painters lasted for nearly a century and the “Surrey” landscapes started to share the field with horrific official portraits, vice-regal, legal or aldermanic, and all greatly bemedalled.

From the 'eighties onwards began the rise of a school of Australian-born painters and with them arose an interest in Australian subject-matter, in the Australian scene, and—more gradually—an appreciation of the distinctive character of the Australian landscape and a delight in the massive gum. Some of the more outstanding of these painters went to study in Paris and returned with their palettes hilariously loaded with the rainbow gamut of the impressionists. They proceeded to impose on their native land the greens and the purples and the heliotropes of their Paris masters. Some of them dutifully painted in little dots. Others brought back the latest fashion of the English painters and they all had a splendid time creating out of this mixture what was confidently proclaimed to be a truly Australian school.

Nevertheless, it must be accorded that the impressionist rebellion with its exhilarating gust of fresh air did have the effect of making painters see a little more starkly the landscape before them, and gradually, beneath the mannerisms and the dots and the “strong brushwork” and the rest, the Australian landscape was beginning to be seen but only dimly. And years later D. H. Lawrence—he had been living in the bush writing *Kangaroo* and *The Lost Boy*—was wandering rather unimpressed through the Melbourne Art Gallery, when suddenly he stopped before a sketch of Puvis de Chavannes and exclaimed with the ruthless clear-sightedness of genius—“This is the finest Australian landscape in the gallery!” It was Chavannes’ original sketch for that vast mural of “Winter” on the walls of the Pantheon—a bleak and angular French snow scene. But its majestic stark and denuded tree shapes and its bleached colours recalled for Lawrence the essential character of the bush far more truthfully than did the more flamboyant Australian school. It was a chastening criticism.

Nevertheless, fine painters were beginning to appear but they usually found themselves in revolt against the ways of the now firmly established and popular

"Australian School". I shall return to them later. Meanwhile throughout the Continent the growth of artistic awareness was gradual but real. Every capital and many of the more important inland towns had built, as a minimum measure of self-respect, their art galleries. And some of these galleries, thanks to private bequests, began to have very impressive collections. Others with small public grants managed as best they could. Some fifteen years ago I exhibited the portrait of a well-known Australian novelist and was approached by the trustees of a northern art gallery. The purchase price was agreed upon, the picture delivered and hung in the gallery and a subscription fund launched to raise the money. After the first rally of donations the matter hung fire and in their desperate zeal to raise the money a subscription box was placed under my unfortunate novelist. Hearing of this, I promptly wrote and offered to subscribe myself the remainder of the fee, and so the matter was concluded with great elegance.

Other galleries, however, have bequests that raise them far above such worries. The Melbourne Gallery has the famous Felton Bequest which has enabled it to acquire a splendid collection with works by Rembrandt, Van Eyck, Corot, Turner, Raeburn, Van Dyck, Tiepolo, and Claude Rubens, to mention only a few. Felton was a manufacturing chemist with a passion for paintings who left his collection and his fortune to the gallery. This bequest—I believe it is by far the largest of any gallery in the British Commonwealth—enables the Melbourne Trustees not only to buy the best available Australian paintings but also to compete effectively in the sale rooms of Europe. In this way, unlike most of the other Australian galleries where art begins, so to speak, in the nineteenth century, Melbourne offers a range of comparison and a variety of example which have effectively broadened the artistic awareness of its people. This process has not been without the usual fuss and protest—I remember, when £5,000 was paid for Corot's "Bent Tree", almost the entire press howled in outraged parsimony and the public wrote to say it had seen lots of trees more bent. But gradually the fuss was forgotten and now the delicate harmony of Corot's enamoured regard entralls the young art student and opens his wondering eyes to the quiet loveliness of the softly dying day. And while the belated citizen with unseeing head buried in his overcoat hurries to his evening meal Corot's young disciple stands rapt and unshivering before the newly-revealed glory. And that same student is stunned and transfixed before Rembrandt's self-portrait and meditates in dark rebellion against the tosh they teach in his art school. For there are art schools in Australia as everywhere else, some good, mostly bad, with technical schools and all the rest down to the small town maiden lady water-colourist with her lessons at a bob a time.

Like all great galleries that of Melbourne acts as an antidote to the schools. But the other Australian galleries have been less fortunate in bequests or the sums have been spasmodic and quickly spent, and where there are no bequests there are no fine collections. Of course, if you cannot get a bequest a very good method is to have a conquest. That is the French system. Napoleon tramping up and down Europe filled the Louvre to bursting with masterpieces. Wherever the Imperial eagles pushed through, great wagon-loads of paintings and sculpture followed them back to Paris. Velazquez and Greco trailed back with them from Spain, and from Italy their baggage train was stacked high with Titians and Giorgiones. Greek

goddesses and Egyptian scribes bumped unhappily along that great trek, the belligerent Benvenuto at his ease, and the gentle Raphael, bewildered, on that rowdy journey. From the Low Countries came Rembrandt and Vermeer and great stacks of lesser Dutchmen until the Louvre grew to be the greatest collection on earth boasting the rarest and finest flowers of Western Civilisation. But of the English school there was nothing! For they never conquered England and nobody seemed to think of a bequest to make up for the failure of conquest. So that to this day the paintings of the English School at the Louvre are so lamentable that every Frenchman imagines Phillip de Champagne or Rigaud a finer portraitist than Raeburn or Gainsborough and none remembers that Turner was the father of Impressionism.

But to return to Australia, except in Melbourne the Australian art student is in a position not unlike that of English students during the war with all the great collections buried safely out of sight. He is dependent for his knowledge of the great line of development of European painting almost entirely on reproductions. Now as everybody knows reproduction even at its best tends to make a fine work look a little less good and a poor one look much better than they are. Worse still by reduction of size, reproduction gives a quite erroneous idea of surface, of finish and sometimes of character. So that, unless the student has the opportunity of travelling — there is a travelling scholarship granted by the art schools of Melbourne and, I believe, Sydney — his knowledge of traditional European painting must be largely reconstructional guesswork. This has had the inevitable effect of producing a somewhat uncritical and unrelated modernism.

Lacking standards of comparison Australian taste generally tends to the modern and utilitarian — or to the nostalgic. An Australian arriving in England is invariably charmed by the Tudor or Elizabethan (he has been made familiar with that by innumerable calendars and Christmas cards) but it will be many years before he becomes even aware of the superlative beauty of the great period of English architecture from Anne to Regency. Gracious serenity is not a quality he will easily recognise. But he is a ruthless judge of the utilitarian and his opinion upon English housing in general will be unprintable. Squalor revolts him and inconvenience infuriates him. But he is like the Englishman in that he is indifferent to simple bad taste. He has botched and bedevilled the unrivalled loveliness of Sydney's harbour with the worst excrescences of the jerry-builder and of private fantasy, just as the modern Englishman has done with his once lovely country. But in Sydney the plumbing is impeccable, and the interiors of the houses will be largely indistinguishable from those of houses of similar income levels in England, but perhaps they have a little more simplicity and airiness on somewhat American lines. The furniture, in Australian timbers, will flounder uncertainly through all the styles of all the periods of all the countries of all civilisations, but with a special predilection for what is called Spanish Mission (though here perhaps I am sadly out of date). The antique is rare, except in those few cases where it has been sought out and brought back from Europe. The only available purchasable antique is the early Victorian or early settler days, somewhat heavy though still retaining some of the dignity of the Georgian tradition. The curtains will not be dissimilar from their English equivalents, though their function is to shut out Australia's blinding light and heat, but in odd houses you will come across very beautiful hand-printed materials.

Perhaps the most outstanding figure in this craft is O'Connor of Melbourne, a great many of whose designs are inspired by the native cave paintings.

These native cave paintings are very curious. They were discovered in early settler days, but apart from their interest to anthropologists, they evoked very little general attention until recently. Quite unlike the Cro-Magnon drawings in the caves of Altamira and of the Haute Garonne, or in the more recently discovered caves



Courtesy of Australia House

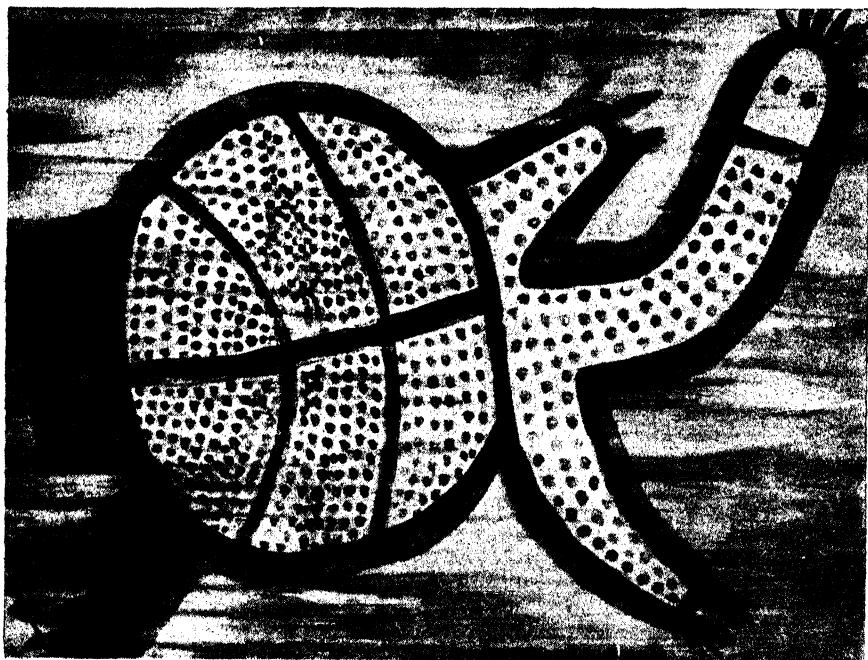
FIG. 1.—Group of freshly-painted Wond'ina heads. The dark line over the central head is explained as representing lightning.
(Ungarinyin Tribe, N.W. Australia.)

of Montignac—those amazing murals of such masterly observation and of such tremendous and vivid realism that they wipe away 20,000 years and set us before the drawings of Rembrandt and of the great water-colourists of Japan—the work of these Australian primitives is of childlike innocence and manual clumsiness. It is superbly decorative with an unhesitating sureness of quite unconscious design, though one must take into consideration the extraneous aids to design

such as the variety of the surface and the patina of flaking colour, which give to these paintings a far greater richness and variety than were originally put there, just as an old wall, moss-grown and weather-worn, will frequently display miracles of subtly orchestrated colour and interwoven arabesques of design. This question of the accidental in æsthetics recalls the recent controversy over the cleaning of the National Gallery pictures. One was tempted at the time to say impatiently that most of the objectors to cleaning were unable to look a fine picture in the face unless it had a couple of centuries of treacle on it. But the matter is not quite as simple as that. I should say, as a general rule whether to clean or not, that the really good pictures should be cleaned because in them the old varnish is hiding their merits, but the poorer ones should be charitably left with a decent covering over their faults. Ageing varnish will sometimes give to a mediocre painting a unifying simplification and a most desirable warm richness of patina. The principle involved is not unlike that in Anatole France's dissertation on the clothing of the Penguins!

But let us return to the Australian native cave paintings. These paintings use much the same materials and colours as those of the caves of Southern Europe—red, yellow ochre, pipe clay and charcoal—but they have none of the skill and freedom of the cave paintings of Europe, none of that complete mastery of observation that can translate an idea into a line or with a few simply related tones throw a living bison or a galloping boar on to the wall. The Australian cave paintings are great clumsy child paintings, totemistic in intention and, by accident almost, tremendous in design. They depict over and over again the great mythical hero the "Wond'ina"—the God the Father of the blackfellow—a human-like being with eyes and nose but never a mouth, and, oddly, a great halo. These Wond'inas are the great ancestors of the aboriginals' mythical past and are linked with the rain and the sky, the great rainbow serpent and the spirit children. The aboriginals do not believe that these paintings are the work of man, though like good gallery directors they keep their charges in good order, even to the more questionable practice of restoring and re-painting. They believe that in the mythical past the god-heroes left their "shadows" on the rock before they vanished into the earth and changed into rainbow serpents. Their explanations of what the paintings represent are various and confused. Vertical lines, for example, in some of the Wond'ina paintings are contradictorily and confidently explained as representing rain, a beard, or a long robe. The thing represented is uncertain but its totemistic significance is sure. If the paintings are "touched" by members of the clan it will rain, and the rainbow serpent's spirit children, living in billabongs will be ready for incarnation. If the rock pictures are repainted the clan multiplies greatly. Apart from these hero motives, Wond'ina, the Rainbow-spirit, and "Kaluru", the Lightning Man, there are, inevitably, representations of the black fellow's chief preoccupation—his sources of food. There are drawings of wallabies and birds and berries. And in these drawings observation begins to replace symbolization. You will find a similar divergence of approach in many another art period. You will frequently find it in the Romanesque. At Vézelay, in Burgundy, in that mighty basilica where Richard Cœur de Lion joined with Phillip Augustus to set forth on the second crusade the great central tympanum of the porch is a pure and wonderful piece of Byzantine stylization. The robes of the Christ swirl and curl in the traditional manner. But

when you enter the basilica you find that unrivalled series of capitals that crown each pier. These depict stories from the Scriptures, scenes of everyday life or exciting and very personal struggles of vice with virtue, and, in these, the sculptors' manner changes. The Byzantine whirls and swirls and elongations yield to a more realistic relish in depicting the people about them—the miller and the peasant, the artisans and the knights, all are there. The rich man lies there with delighted devils tearing his soul out of his dying mouth, and on the other face of the same capital, the carefully cradled soul of Lazarus is being carried up by angels. On one capital the devil is calling music to his aid to help in seducing a woman's soul—without doubt the sculptor must have had words with a troubadour. On another, Eve, alongside a very twining apple tree, tempts a timorous Adam. All these capitals depict the life of



Courtesy of Australia House

FIG. 2.—Long-necked freshwater turtle. (Ungarinyin Tribe.)

the time with a vigorous relish—a down to earthness—with a directness of observation quite different from the solemn majesty of the Christ of the tympanum with its traditional and reverent Byzantine stylization. And the difference between the Wond'inas and the Wallabies is analogous—the same change from ritualistic symbolization to realistic gusto.

It has been suggested that these cave paintings may have an effect upon the Australian painters of our day. I think not. They may be used as a motif of decoration, such as in the printed materials I have already mentioned. But except, perhaps, for some bright young modern who may replace his imported thorns by haloed Wond'inas I cannot see any possibility of their influencing present-day trends. Indeed, the exact contrary is taking place and if to-day you were to travel across the scorching centre of Australia you might come across a small group of aborigines patiently painting in water colours in the most orthodox white man's manner.

What are the present-day trends of Australian painting? The answer is much the same as here—a fairly solid block of indifferent orthodox painting, many varieties of academised impressionism and, now, an energetic and assertive “modern” movement, with many good painters. My fairly long absence from Australia makes it inevitable that I am somewhat out of touch with the more recent development of the modern movement, but I have seen a fair number of canvases and reproductions and what I have seen gives me the impression that its roots are rather in Europe and America than in England. There is little sign out there, for example, of the whimsy-whimsy of the English neo-romantics. You may find a few thorns and so forth, but, for the most part, I have been impressed by a certain starkness—perhaps



Courtesy of Australia House

FIG. 3.—Aboriginal cave painting of a wallaby in red ochre and white pipe clay, and stencils of human hands, obtained by the spitting of chewed pigment around the hand placed on the wall. (Ungarinyin Tribe.)

symptomatic of the general national cult of toughness. But that is another and a longer topic!

The “modern” movement is, of course, there as elsewhere violently assailed and aggressively defended. A few years ago there was a tremendous upheaval which for spectacular uproar quite eclipsed the little bother here over the Picasso-Matisse exhibition at the Victoria and Albert. The matter concerned the award of the yearly Archibald prize for the best portrait of an Australian by an Australian. (Archibald, who left this bequest, was a proprietor of the *Sydney Bulletin*, that famous Australian weekly that began by acquiring Phil May from London and then returned the debt with interest by losing David Low to London.) Previously this prize—a matter of some £400—had been awarded to capable and innocuous portraits of academic tendencies, but suddenly in 1943 the judges, taking their courage in a firm grip,

awarded it to a painting of definitely "modern" leanings. Then the uproar started. Outraged painters of academic habits who had come to regard themselves as the only ticket holders in this yearly sweepstake assembled in furious protest and finally brought the matter to the High Court. There was a complicated procedure of injunctions to prevent payment of the prize, on the claim that the picture was ineligible as it was a caricature and not a portrait, but the exact nature of the legal manœuvres I do not know. The petitioners lost their case and the winner, Dobell, not only got his prize, but also such publicity as to make his name known almost as well as a test cricketer's. What I have seen of Dobell's work has impressed me greatly, and it may be imagined what were my feelings when, some years later, I learnt that an exhibition of paintings had been contributed to pay the legal expenses of the petitioners and that one of my paintings had been contributed by its owner in this cause. May I here take the opportunity of publicly congratulating Dobell on his deserved good fortune?

There is a school of painting, associated with the name of Meldrum, that has produced some splendid work. Meldrum, himself, is an artist of the very first rank, and this school has contributed so much that is original in æsthetic theory that I should like to give a brief survey of its position.

It is, of course, well known that Impressionism in France and then elsewhere developed quickly in two directions—into academised impressionism and into post-impressionism or the so-called modern movement. Academised impressionism continues to hold the imitation of nature as its aim but "in the manner of", whereas post-impressionism, however divergent in its various manifestations, is unanimous in rejecting the imitation of nature as its object. Post-impressionism may insist variously on emotion, on structure, or on design, but the one thing it cannot abide is nature. In short, contemporary æsthetic theory, claiming that the imitation of nature or the representation of objects has been done so skilfully by a number of artists from Velasquez to Constable that nothing more remains to be done in this field, has rejected visual realism as its criterion. But this Australian school of painting claims that the rejection of fidelity to nature is based on a fundamental confusion. It claims, in effect, that the "reproduction of objects" has nothing to do with visual realism. It allows that old-fashioned realism took as its aim the reproducing of objects but it insists philosophically on the difference between the inferred three dimensional world of objects and the two dimensional world of colour and form that is immediately given in seeing. It claims that it is this world of pure pattern—of "the innocence of the eye" as Leonardo called it—and not the world of "objects" that is the realm of the painter.

When we look anywhere two things occur: the eyes see shapes of colour, and the mind, by the automatic process of sense-perception, immediately selects and arranges these colour-forms into "objects"—into things with names and associations, chairs, trees, skies, or faces. "Objects", as such, are not immediately "given" in seeing but are elaborately inferred and they disappear lamentably when submitted to philosophical speculation. And now they have disappeared from æsthetics. Visual realism lies not in depicting the world of objects but in exploring and defining the sensorily anterior world given in seeing—the world of pure pattern of colour and form. It is the failure to realise this distinction that has produced the modern revolt against

"fidelity to nature," and created that vacuum into which every "ism" has rushed and left us with no criterion of æsthetic judgment except our sensibility, which, on analysis, reveals itself to be our old friend the conditioned reflex in dainty disguise. So the æsthetician in trusting to his sensibility flops back into the lap of his grandmother and "knows what he likes".

The new realism, on the other hand, disregarding conventions of sensibility, and suspicious of those forms of distorted representation in revolt against representation, strives to discover, free of associations, the world of our eyes. Nature plays to our eyes its rich symphony of pattern, but this, in the automatic process of sense-perception, is immediately obscured by our automatic rearrangement of it into "objects". The painter strives to check this process and to remain on the plane of colour and form, to discover the secrets of orchestration of this infinitely complicated score. He paints in order to see. This, briefly, is the æsthetic theory of this school which has many vigorous adherents and many vigorous attackers.

Now, the conflict of æsthetic theory in Australia is loud and sometimes bitter. Conflicting art societies spring up in ardent rivalry, though they quickly become indistinguishable one from another, for it is a sad reflection that the intention behind a work of art is frequently indiscernible in the result. But conflict, enthusiasm, and tough earnestness are there in plenty and Art in Australia is, to-day, a vigorous plant.

DISCUSSION

Mr. JOSEPH HOY: In view of the difficulties of the aspects of the country, could the lecturer tell us whether the European training of the artists which he mentioned is of very great value to them in painting Australian landscapes? Do they have to adjust their training somehow?

Mr. C. COLAHAN: If the artist has had the rare good fortune to have studied under a master whose aim was to teach to see rather than to paint in a special manner he will approach all subjects with equal relish. Velasquez painted a Pope or a pot with the same reverence. But if he has learnt to paint in a pre-ordained manner his training will interpose itself opaquely between him and any new aspect of nature.

Mr. W. BARTLETT: With reference to modern painting, does the lecturer think that the moderns are actually creating an Australian school of art more or less in line with the Americans' attempt at modern painting?

Mr. C. COLAHAN: Possibly. In some of the modern Australian paintings that I have seen there is much directness of statement and considerable vigour, but with a certain self-conscious "toughness." As to whether an Australian school is being so created is a highly debatable question. But there are very good painters working in Australia to-day.

THE CHAIRMAN: It is now my pleasant duty to express thanks and appreciation on your behalf to Mr. Colahan for the extraordinarily interesting lecture he has given. Mr. Colahan's answers to the questions have added to the impression he created when he read his paper. I am sure it would be the wish of all of you that I should express our deep thanks and appreciation to him for giving us so interesting a lecture.

The vote of thanks was carried with acclamation. And after a vote of thanks to the Chairman had been proposed by Sir Thomas Dunlop and carried with acclamation, the meeting terminated.

RETIREMENT OF MR. A. G. TOYE

The retirement of a member of the staff who entered the Society's service a few months after the end of last century is an event which cannot pass unnoticed in the *Journal*, particularly when that member is one known to so many Fellows as is Mr. A. G. Toye. Mr. Toye, who has been the Society's accountant for the past ten years and who before that was with the examinations department, came to the Society from the laboratory staff of the City and Guilds Institute where he worked for



H. E. Armstrong, F. H. Spencer and other members of that distinguished circle of scientists, many of whom he met again later on at the Royal Society of Arts.

For many years past his genial smile has welcomed callers at the Society's outer office and he will be greatly missed.

The Council are presenting Mr. Toye with a cheque on behalf of the Society and members of the staff have given him a wristlet watch. In addition, he will carry away with him into his retirement the good wishes of a very wide circle of friends and acquaintances.

GENERAL NOTE

THE ART OF VAN GOGH.—The sunflowers, the chair, the self-portrait—all the familiar pictures of Van Gogh's last tormented years are included in the Art Council's comprehensive exhibition of Van Gogh's paintings and drawings, which remain on view at the Tate Gallery until January 14th before going on tour. These astonishingly powerful

and original works, which have had such a profound effect on modern painting, are far from characteristic, however, of the artist's earlier styles; and many of the visitors now thronging the five rooms devoted to his work will doubtless be amazed to observe the contrast in style and outlook revealed in the early paintings of his Dutch period and the last works painted in the most brilliant primary colours. Even more extraordinary is the fact that all Van Gogh's work was produced in the brief span of ten years, the painter's output in the decade of the 'eighties actually far exceeding Cézanne's accomplishment during forty years of unceasing labour.

To observe the successive influences in the course of the artist's feverish career one need look no further than the first gallery, where the drawings and water-colours of all periods are grouped. The industrial scenes inspired by Millet (1880), the water-colours and crayon sketches of Paris (1887), and the last passionate drawings, done in sepia with a reed pen in the blazing sunlight of St. Rémy, are evidence of his unceasing experiments in various styles. Yet from the beginning, as a discerning critic has pointed out, "some quality in Van Gogh remains steadfast among the conflicting influences of his time".

Passing from the low-toned paintings of his Dutch period—which include the intense and sombre canvas called "The Potato Eaters"—into the last galleries is like stepping out of some darkened room into dazzling, distorting sunlight. In Paris we see him under the spell of the Impressionists, adopting for a time the *pointilliste* technique (as, for example, in "The Bunch of Flowers"), and inspired by Japanese prints. Then in 1888—the *annus mirabilis*, as Fry has called it—we enter on the last phases. The homage to Gauguin at Arles, the writhing landscapes painted with long brush-strokes of pure colour, the final portraits feverishly painted in lucid intervals—here they are, those astonishing products of his distorted vision. Goethe's dying words "Mehr Licht" seem to have become Van Gogh's obsession, and to achieve it his palette has been reduced to pure yellow and orange, Prussian blue, emerald, and Veronese green and red.

Need we wonder that, when Post-Impressionism dawned on the world of art in 1910, Vincent Van Gogh was "the most overpowering revelation"?

N. A. D. WALLIS.

NOTES ON BOOKS

PEAK PANORAMA. KINDER SCOUT TO DOVEDALE. By W. A. Poucher. Chapman and Hall. 1946. 21s.

In the steady flow of open-air books Mr. W. A. Poucher's "Peak Panorama—Kinder Scout to Dovedale" will be welcomed by the great army of hikers whose exploring spirit reaches beyond the confines of the well-trodden paths of their home counties, as well as by the holiday maker who prefers the murmur of stream and the song of birds to the cacophony of a noisy seaside resort. The volume is one of a group of picture-books by the same author which aim to introduce to the townsman some of the lesser-known aspects of, or at least less often visited, parts of well-known scenic beauty-spots in the British Isles, by providing photographic surveys of them. Previously published records included the Lake District, Snowdonia and the Scottish Highlands. The present volume adequately fulfils its purpose.

Mr. Poucher presents in his book eighty-five photographs of uneven merit which testify his affection for the crags and fells, and the dales of this country's miniature mountain district.

The author admits the popularity among a multitude of people of the Peak District, but pleads for a wider exploration by the climber, the ardent walker and, above all, by the youth of Britain. He eloquently sets forth the joy of discovery that is to be reaped by those who desert the highways in favour of the by-ways, and he provides a stimulating account of the tours he has made. The photographs show a pleasantly unobtrusive competence; some of the plates are perhaps rather too repetitive in character, but that, one may assume, was conditioned by the nature of the subject. How far the author has succeeded in capturing pictorially the rugged architecture of the bleak ridges, the fantastic shapes of the gritstone rocks, the loneliness of the bare moors, the charm of the

dales and valleys, must be left to the reader to decide; that Mr. Poucher is an enthusiast there can be no doubt—the engagingly written text which accompanies his pictures is full evidence of this.

Among the illustrations are some notable examples of outstanding merit such as the convincingly suggested massive structure of Main Tor and Rushup Edge from Lose Hill, the mighty buttress in the Winnats with the lowland rolling away into the distance, the delicately treated Ashopton Viaduct with its fine atmospheric effect, the simplicity and grandeur of fluted pinnacles at Robinhood Stride. The author tells us that circumstances prevented his visit to the district until the month of October, a season when unreliable weather conditions, frequent mists and occasional fogs make successful photography exceedingly difficult and often quite impossible.

He appends some very useful notes in which he gives helpful advice to the camera-user regarding the best time of the year, and the hours of the day, when some of the subjects pictured in the book will present the most favourable views.

From a short summary of photographic data which the author supplies at the end of the book, one gathers that all photographs were taken by him with one of those ingenious, and conveniently carried miniature cameras, a Leica. Two interchangeable lenses were used, a 5 cm. Summitar and a 3.5 cm. Wide Angle Elmar. In the opinion of your reviewer the miniature camera, admirable as it is in very many ways, is not the most suitable type of instrument for the successful portrayal of scenery such as this volume presents. For one thing, success or failure of mountain photography is often determined by discrimination in selective focusing. True, it is possible to do this with a miniature camera by using lenses of different focal lengths, but the extent to which this can be done is limited.

Another disadvantage is the frequent loss of quality of the photographs due to over-enlargement of the original minute 35 mm. film: several plates in this volume show the defect, and give a "woolly" appearance which is not improved by the evidences of retouching and consequent falsifications of tone values.

The volume has been done with a practised hand and is attractively produced. "Peak Panorama" is a picture-story told by a great lover of nature. It is a book pleasant to look at, and will be welcomed as a guide by those to whom this fascinating aspect of the English scene has remained unknown.

E. O. HOPPE.

TREES IN BRITAIN. By L. J. F. Brimble. Macmillan & Co. 1946. 15s.

This well got up and beautifully illustrated book by L. J. F. Brimble is intended for readers who wish to learn something about the trees growing in this country, those more or less cultivated in gardens and shrubberies and those growing, and cultivated, in woods and forests; for there will be forests in a near future in Britain. This book forms a companion to Mr. L. J. F. Brimble's *Flowers in Britain*.

The illustrations are admirable and include some beautiful pencil drawings by that great tree lover the late Venerable Lonsdale Ragg, D.D., Editor of *The Tree Lover*.

The author wisely does not envisage a knowledge of botany among his public and the first chapters deal with the form and structure of plants in general and of trees in particular. A noteworthy feature of the book is the stress the author lays upon the rôle of trees in the folk-lore, which is commonly found among peoples in other parts of the world and in the literature of several countries in Europe.

The great difference between *Flowers in Britain* and the present volume is due to the fact that flowers, even the common ones of which 2,000 were mentioned, greatly outnumber trees; therefore a higher percentage of the tree species receive comparatively detailed treatment. Moreover, a high proportion of the trees of Britain to-day are exotics, so as the author says "we are really dealing with trees in Britain and not necessarily with British trees." That such is the case an examination of the afforestation work of the Forestry Commission during the past quarter of a century shows. They have chiefly been dealing with exotics such as Douglas fir, Japanese larch, Sitka spruce, Tsuga, amongst the more recent introductions, and Norway spruce, Corsican pine, cypresses and so forth amongst the older.

Trees or their products have always been

an important commercial commodity, the timbers often having different common and trade names according to country and even locality. In this book the author usually confines himself to the most popular of these common names, the generic and specific names so far as possible being kept up to date.

Part II deals with Conifers and other Gymnosperms, the so-called softwoods, and Part III with Broad-leaved trees (Angiosperms), the so-called hardwoods.

In his treatment of the Conifers the author opens with the Maidenhair tree or Ginkho, that unique survival of a division of Gymnosperms which, apart from this plant, have become extinct. A beautiful drawing of this delicate foliated plant by Lonsdale Ragg is given. Then comes the monkey puzzle or Chili pine, a tree which always appears so out of place in the English scene.

Extraordinary ignorance exists in the country on the subject of the ordinary Conifers, even the common indigenous Scots pine is usually alluded to in England as Scotch fir, whilst other Conifers, spruces especially, are referred to as pines, and also the typically foliated larch. Cedars, silver firs and the North American Douglas fir are now settled inhabitants of the island with our junipers and cypresses. The yew we regard as a national tree. The hemlock (*Tsuga*) and *Thuja* are being planted to some extent by the Forestry Commission whilst many will be acquainted with specimens of the great redwoods (*Sequoia*) occurring on private estates.

The broad-leaved trees of this country roughly divide themselves into garden or horticultural subjects and forest subjects. Tulip trees, magnolias, lime, sweet bay trees, tamarisks are instances of the first.

The forest group is of interest since it comprises a number of species which may be grown for purely ornamental purposes in parks, shrubberies and gardens, or as commercial crops to produce timber, or again as coppice crops to yield small materials. In the first group such species as the London plane, elm, lime, horse chestnut, sycamore, birch and holly fall; while in the second are the oak, beech, hornbeam, willow, elm, sycamore, walnut, poplar, birch, ash and sweet chestnut; and in the third the chief coppicing species such as hornbeam, ash, oak, hazel, sweet chestnut, willow and poplars.

As in the case of the first volume, *Flowers in Britain*, the author treats his subject in an easy and interesting manner and his informative book may be recommended to all lovers of trees, whether they grow in the open or in shady woodlands and forests.

E. P. STEBBING.

TITIAN. EUROPA, in the Gardner Museum, Boston, Massachusetts. With 18 illustrations and an Introduction by Stuart Preston.

THE GALLERY BOOKS, No. 7. Percy Lund Humphries & Co. 1945. 4s. 6d.

This particularly interesting Essay begins with a recital of the story of Europa, the lovely daughter of the king of Phœnicia. The momentous adventure, recorded in the picture selected as the subject for the present issue, is that which determined the destiny of the princess, with its pregnant consequences. In virginal innocence, accompanied by her ladies-in-waiting, Europa comes to the sea-shore to enjoy the invigorating breezes and to renew friendship with the cattle accustomed to wander there. Free and unsuspecting she disports with her companions, when Jupiter, with his ever alert and acquisitive eye for female charms, chances to see her, and attracted by her beauty, resolves to possess her. But how to approach without causing alarm and flight! Observing the friendly relations between the maidens and the cattle he decides to assume one of his famous animal impersonations, and in the form of a white bull to mingle with the other cattle so that he may at a favourable moment seize and carry off the princess. His stratagem succeeded, and bearing the protesting lady on his back he plunged into the sea and carried her off to Crete. Subsequent developments were complicated and far-reaching.

The writer of the essay sees in the picture the "very breath of classicism." He finds in the eye of the bull an expression of triumphant joy. But is it joy? It is true that he has won his prize, and by his disguise has hoodwinked his stately and august spouse, who, while he masqueraded on his amorous pursuit, was dutifully tending the home fires; but by the apprehensive look in his eyes his triumph seems qualified by anxiety, not only lest his lovely burden should slip off his "surging back," but in the sudden realisation of the inevitable embarrassments that must result from his reckless impetuosity. However,

with Jupiter's usual luck, Europa, now a goddess in true Olympian tradition, eventually acquired another husband who good-naturedly brought up her sons as his own; and so, Jupiter, with the adroitness acquired by experience, quietly slipped his responsibilities for the time being.

The story is, of course, very ancient and the abduction has often figured in drawings, paintings and sculpture. The writer gives an illustration of a sixth century B.C. terra cotta, which he describes as majestic, but which others might more appropriately call interesting. The fifteen-sixteenth (?) century wood-cut, Fig. 3, is quaint and shows the princess unsuspectingly, yet with some hesitation, caressing the perfidious bull. There is also a drawing by Dürer, Fig. 4, in which Europa seems to be the pleased captor of the dejected bull rather than his captive.

Titian's contemporaries were generous in their recognition of his supremacy in technique and especially in his handling of colour but were less impressed by his composition. The writer describes some of his methods by which he achieved beauty of colour and "splendid translucency". According to his pupil Palma Giovane, over tempera he applied oil glazes and scumbles of colour with his

fingers—"much more with his fingers than with his brush." It may also be noted that he left his pictures for some time between successive stages of the work, thereby reducing the tendency to develop surface cracks. Where cracks have occurred, as in the *Bacchus* and *Ariadne*, circumstances may have interfered with this procedure.

Instructive criticisms of certain details of the picture are given and interesting notes relating to the painter's tremendous output. Besides his very many larger works, both sacred and profane, he painted numberless portraits of persons of quality. Yet in spite of his extensive practice he seems to have had perpetual "money troubles."

Two other Titian pictures are illustrated, the *Death of Actæon* and the *Andromeda*. In these, as in the *Europa*, the painter presents fine, healthy specimens of feminine physical charm at its period of fresh and perfect bloom, delectable to gods and men, the approved incarnation of goddesses as conceived in the imagination of the voluptuous Venetian mind of the period.

This issue of the series maintains the high level of production we have now become accustomed to look for in the *Gallery Books*.

F. H. A.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, JANUARY 5. Electrical Engineers, Institution of at the Liverpool Royal Institution, 6.30 p.m. C. M. Cook, "Electric Traction on the Southern Railway." At King's College, Newcastle-on-Tyne, 6.15 p.m. B. Adkins, "Amplidyne Regulating Systems."

TUESDAY, JANUARY 6. Kinematograph Society, British, at 16 St. Mary's Parsonage, Manchester, 10.30 a.m. P. Corry, "Light and Colour in Stage Presentation." At the Neville Hall, Newcastle-on-Tyne, 10.30 a.m. G. Parr, "The Cathode Ray Tube."

WEDNESDAY, JANUARY 7. Carriage and Automobile Manufacturers, Institute of, at the Royal Society of Arts, W.C.2, 6.30 p.m. A. G. Douglas Fleece and P. M. A. Thomas, "Recent Trends and Developments in Private and Commercial Motor Body Building at Home and Abroad."

Electrical Engineers, Institution of, at the Caledonian Hotel, Aberdeen, 7.30 p.m. H. Davies, "The Design of a High-Fidelity Disc Recording Equipment."

Interplanetary Society, British, at 107 Charing Cross Road, W.C.2, R. A. Smith, "The Man-carrying Rocket."

Kinematograph Society, British, at the G.-B. Theatre, Wardour Street, W.1, 7.15 p.m. F. S. Hawkins, "Power Supply for Studios."

THURSDAY, JANUARY 8. Metals, Institute of, at 4 Grosvenor Gardens, S.W.1, 7 p.m. Dr. L. B. Hunt, "Silver."

Physical Society, at the National Hospital, Queen Square, W.C.1, 4.30 p.m. Professor H. Hartridge, "The Use of Supersonic Sound by Animals."

Textile Institute, Municipal Technical College, Blackburn, 7.15 p.m. R. Coats, "Lubrication Practice in Textiles."

FRIDAY, JANUARY 9. Mechanical Engineers, Institution of, S.W.1, Professor E. Schmidt, "Design of Contra-Flow Heat Exchangers."

Textile Institute, 16 St. Mary's Parsonage, Manchester, 8.1 p.m. Dr. A. Roberts, "Selection and Training of Textile Managers."

Geographical Society, Royal, S.W.7, 8.15 p.m. A. J. Marshall, "New Explorations on Jan Mayen Island."

TUESDAY, JANUARY 13. Chemical Engineers, Institution of, at the Geological Society, W.1, 5.30 p.m. B. Edgington, "Detergency."

Electrical Engineers, Institution of, at Queen's University, Belfast, 6.45 p.m. A. Burke, R. C. Cuffe and W. O'Neill, "Record of Experience on the Irish Electricity Supply System."

At the Corporation Electricity Department, Leeds, 6.30 p.m. J. R. Mortlock and C. M. Dobson, "Neutral Earthing of Three-Phase Systems, with particular reference to Large Power Stations."

Textile Institute, 16 St. Mary's Parsonage, Manchester, 8.7 p.m. R. M. Marks, "Production per Man Hour in Cotton Manufacturing."

WEDNESDAY, JANUARY 14. Dyers and Colourists, Society of, in the Queen's Hotel, Belfast, 7.30 p.m. G. Brearley and J. Starkie, "The Hydrosulphites—their preparations, Properties and Textile Applications."

Electrical Engineers, Institution of, W.C.2, 5.30 p.m. D. M. Heller and L. C. Stenning, "Reference-Crystal-Controlled V.H.F. Equipments."

At the Heriot-Watt College, Edinburgh, 6 p.m. L. H. A. Carr, "The Teaching of the Principles of Electrical Machine Design."

Kinematograph Society, British, at the G.-B. Theatre, Wardour Street, W.1, 11 a.m. W. Percy Day, "The Origin and Development of the Matte Shot Process."

Petroleum, Institute of, at 26 Portland Place, W.1, 5.30 p.m. J. C. Swallow, "Polythene."

THURSDAY, JANUARY 15. Design and Industries Association, at the Royal Society of Arts, W.C.2, 1.30 p.m. Kenneth Holmes, "Museums and Industrial Design."

Electrical Engineers, Institution of, W.C.2, 5.30 p.m. D. E. Lambert and J. Christie, "Standardization of Switchgear."

At the Trinity College, Dublin, 6 p.m. B. McQuillan, "Joint Operation of Thermal and Hydro-Electric Stations in Eire."

Textile Institute, Midland Hotel, Bradford, 7 p.m. Dr. C. S. Whewell, "Cloth Finishing."

FRIDAY, JANUARY 16. Dyers and Colourists, Society of, at the Gas Department Showrooms, Manchester, 6.30 p.m. Dr. E. B. Abbott, "A Commentary of the Light Fastness of Dyed Textiles."

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4760

FRIDAY, JANUARY 16th, 1948

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

TUESDAY, JANUARY 20TH, at 2.30 p.m. (*Dominions and Colonies Section*).—“RECONSTRUCTION IN MALAYA”. By A. T. Newbould, C.M.G., M.C., E.D., Chief Secretary, Malayan Union. This paper will be read in his absence by N. R. Jarrett, C.M.G., Secretary, Association of British Malaya. Sir Frank Stockdale, G.C.M.G., C.B.E., Adviser on Development Planning, Colonial Office, will preside.

WEDNESDAY, JANUARY 21ST, at 2.30 p.m.—CRAFTSMANSHIP.—(III) “THE CRAFTSMAN AND DESIGN IN THE TEXTILE INDUSTRY”. By Alec B. Hunter, F.S.I.A. Sir Kenneth Lee, Bt., LL.D., Chairman, Tootal Broadhurst Lee Co., Ltd., will preside. (The paper will be illustrated by lantern slides.)

MONDAY, JANUARY 26TH, at 4.30 p.m. (*Cantor Lecture*).—“THE COMMON COLD”. By C. H. Andrewes, M.D., F.R.S., of the National Institute for Medical Research. (Illustrated by lantern slides.)

WEDNESDAY, JANUARY 28TH, at 2.30 p.m.—“RECENT PROGRESS IN THE MAKING OF PRECISION INSTRUMENTS”. By A. J. Philpot, C.B.E., M.A., B.Sc., F.INST.P., Director of Research, British Scientific Instrument Research Association. W. H. Eccles, D.Sc., F.R.S., will preside.

CANCELLATION AND CHANGE OF DATE

Owing to the death of Mr. James H. Hogan, R.D.I., the paper previously announced for Wednesday, February 11th, has been cancelled. In its place, Mr. John Waterer, N.R.D., F.S.I.A., will read his paper on “Craftsmanship and Leather”. This was to have been given on March 3rd.

ARRANGEMENTS UP TO EASTER

A list of arrangements up to Easter will be found on page 133. A programme of meetings for the Session can be obtained on application to the Secretary.

LETTER TO "THE TIMES"

The following letter was forwarded to the Editor of *The Times* from the President and Master of the Faculty of Royal Designers for Industry, and was published on the 10th January.

6th January, 1948.

Sir,

Industrial Design is now officially recognised. But public recognition on a wide scale as in medicine or architecture is still far ahead. For this reason, the important place allocated to it in the Government's scheme for celebrating the centenary of the Great Exhibition of 1851 is welcomed by the Faculty of Royal Designers for Industry, a body of leading designers which was established by the Royal Society of Arts ten years ago to mark the growing prestige of the profession.

The Faculty is convinced that in these critical days insufficient stress is placed upon the importance of high quality, not only in the materials and workmanship, but also in the design of export products; nor is it generally appreciated that this cannot be achieved without first proving the quality of goods on the home market. Yet it is quality more than anything else which will secure and maintain our hold on the profitable markets on which we now depend for our existence, and as in machine production designing costs are spread over a vastly increased number of units, there is all the more reason that design standards should be high.

The Princess Elizabeth, President of the Royal Society of Arts, in reply to an address of welcome at the recent Inaugural Meeting of the Society, stated that this country had made an historic contribution to human progress by leading the world into the industrial revolution. "But", Her Royal Highness added, "there has also been a legacy of squalor, misery and ugliness . . . and we have a duty to lead the world in finding the remedy". These are striking and inspiring words. The short period of preparation for the 1951 Exhibition will provide a magnificent opportunity to give them the fullest practical effect.

In the view of the Faculty of Royal Designers for Industry, good industrial design can only result from the closest collaboration between technical, design and sales teams in industry, backed by enterprise on the part of retailers, and with the encouragement of an increasingly critical public. In every one of these groups there are signs to-day of movement in the right direction, but the need is urgent, and further action of a decisive and even revolutionary character is called for.

The announcement of the 1951 Exhibition gives just such a call, and a full response must be made now if appreciable effects are to mature in time for that Exhibition. If there is a real and speedy effort on the part of all the various agencies, great and small, industrial, commercial and educational, which influence the character of the goods which we produce, 1951 may well see the words "Made in Britain" established as synonymous with quality in its fullest sense, and so open the gateway to a new and better era of prosperity.

Yours, etc.,

H. A. F. LINDSAY,

*Chairman of Council, Royal Society of Arts and President,
Faculty of Royal Designers for Industry.*

GORDON RUSSELL,

*Master, Faculty of Royal Designers for Industry and
Director, Council of Industrial Design.*

THE DEVELOPMENT OF SOUND RECORDING AND REPRODUCTION

By Sir ERNEST T. FISK, HON.M.I.E.E.

Managing Director, Electric and Musical Industries, Ltd.

Third Ordinary Meeting, Wednesday, November 19th, 1947

Sir NOEL ASHBIDGE, B.Sc., M.I.E.E. (*Deputy Director-General, British Broadcasting Corporation, in the Chair*)

THE CHAIRMAN: I have the very pleasant task this afternoon of introducing to you our speaker, Sir Ernest Fisk.

To many of us who have been more or less in wireless for some years, no introduction is really necessary, but I feel there may be some people in the hall this afternoon, who perhaps may not be quite fully aware of the very distinguished career which Sir Ernest has had.

He joined the Marconi Company in 1906, which seems to me a very long time ago; but I assure you he is still decidedly youthful. Then he went to Australia, in about 1910, and became General Manager of Amalgamated Wireless in 1913. He undertook a succession of successful tasks, until he eventually became Chairman of Amalgamated Wireless, in 1932.

I should like to say a brief word about the great work he did in Australia. He was, of course, the great pioneer of wireless in Australia. He built up several factories and organisations including one which, although I have never seen it, I understand was a model one in every way. It was his voice which first traversed the distance between this country and Australia. He pioneered the first broadcast from Australia to this country. He was very much concerned in the pioneering of the short wave beam telegraph which we all accept as a matter of course now, but which, I can assure you, in the early twenties was surrounded with the hottest possible controversy.

Sir Ernest came to this country once more somewhere about two years ago, much to the gain of this country, and became Managing Director of Electric and Musical Industries, and it is on the work of that firm he is going to speak to us this afternoon.

Of course, the H.M.V. Company is well-known throughout the world as the greatest firm associated with the recording and reproduction of sound, and we are going to hear this afternoon of their latest achievements.

I will now therefore call upon Sir Ernest to deliver his paper.

I propose to refer in the first instance to some elementary principles and facts, and to say that sound—a term we use so easily—consists in air waves, in variations in pressure of the atmosphere surrounding us. Variations in pressure of our atmosphere are quite commonplace apart from sound. We are accustomed, many of us, to seeing the barometer, which was, I believe, the first instrument for measuring variations in atmospheric pressure. Perhaps I should say what we really mean by atmospheric pressure. It is the effect of the pressure of the atmosphere of the earth on the surface of the earth and things on it. At what is called normal pressure, that is, when the barometer is standing at 30, the pressure is round about 15 lb. weight on every square inch of the earth's surface, and of ourselves. That pressure varies, as we know; sometimes the barometer goes up, which means that the air pressure is increased; at other times it goes down, which means the air pressure has decreased. Those changes are measured by the barometer: they are also recorded by an instrument called the barograph, the wavy line on the chart

of which shows the effects of variations of atmospheric pressure in nature. That, as I shall show you a little later, is remarkably similar to some of the records which are made of sound waves, because sound waves are very much the same thing. They are variations in the pressure of the air around us.

Sound itself, the actual sensation, does not exist in nature. It is a psychological reaction of the mind to these variations. The human ear is so constructed as a mechanical apparatus that its tympanum or ear drum—with its intricate connection to the inner ear, and through this to the brain—moves in and out according to the amount of air pressure on it. You know, those of you who have flown in aeroplanes, that if you come down very quickly you feel discomfort in your ears, because you have come from a lower pressure in the air to a higher pressure on the ground, and the mechanism of your ear has not adapted itself very quickly, and so you feel some discomfort, but you hear no sound. You get no sound from the variations of the barometer. You only get the sensation of sound when the variations of air pressure range between certain more or less arbitrary limits. If there are variations at the rate of twenty or thirty times a second—you might call them air vibrations—you hear a low sound, and from there up to 8,000, 10,000, perhaps in some cases, 15,000 times a second, the mind responds by interpreting these vibrations as sound. So the old conundrum about a picture falling to the ground in a room with no human being or animal within earshot must be answered by "It does not make a sound", for sound is the interpretation by the mind of the effects produced on the ear within the range of what we call audible frequencies.

Nearly seventy years ago, on May 8th, 1878, Sir William Preece in this room, with the very instrument in front of me, gave one of the first public demonstrations of the recording and reproduction of sound in this country. The Edison Phonograph had just been invented in America as a part of a telephone system upon which Edison was working.

In his experiments Thomas Alva Edison found that with the aid of a telephone diaphragm, operating a stylus on a morse instrument, he could make impressions upon a strip of tape responsive to words he shouted into the telephone. If he reversed the process and, instead of making the diaphragm vibrate with his voice, repassed the indented paper against the stylus in the same direction, the indentations would vibrate the stylus and the diaphragm, faintly reproducing the original sound. Edison then worked to convert his discovery into a practical device for use as a telephone relay. The attenuated electrical energy reaching the far end of a telephone line would make a mechanical record and that record could be adapted to introduce new energy for relaying along a further length of line, the new energy being drawn from the human agency which turned the handle of the machine.

Although one of Edison's early practical devices took the form of a spiral groove upon a flat disc, in the main he seems to have concentrated on the cylindrical form. He cut a spiral groove on a brass cylinder fixed on a horizontal screw of the same pitch as the spiral groove. The cylinder was covered with a sheet of soft tin foil. During rotation of the cylinder the tin foil was indented by a stylus attached to a vibrating diaphragm, and on replaying against another diaphragm, with a stylus, the sound was reproduced as in the earlier experiment but with clearer and louder results. To this talking machine Edison gave the name of "Phonograph".

In 1885 Alexander Graham Bell with his cousin Chichester Bell and Charles Sumner Tainter, an Englishman, produced their "Graphophone" machine in the Volta laboratories at Washington, D.C., which were financed from the proceeds of the prize awarded to Graham Bell by the French Government for his invention of the telephone. Bell and Tainter found that with the limited energy available to vibrate the diaphragm and stylus a louder and better record could be made if a sharp flat-fronted recording stylus were used to cut a record in a wax surface on a cardboard cylinder. For reproducing they used a round-ended stylus. Edison adopted these improvements and a legal battle ensued from which each party was awarded damages of one dollar and patent licences were exchanged. Thus the Edison Phonograph and the Bell and Tainter Graphophone both used the wax cylinder system. In relation to the surface of the wax, cutting was in an up-and-down, or "hill-and-dale", manner.

Before Edison's invention of the talking machine, a French printer, descended from one of the Scottish Jacobite families, named Edouard-Leon Scott de Martinville, produced in 1857 a machine which made a visible record of sounds in a side-to-side or "lateral" manner upon a smoked paper fastened to a cylinder. The sound energy was conveyed to a membrane by a resonator or funnel and the membrane was caused in an ingenious manner to move a hog's bristle across the surface of the paper so as to make a wavy trace when the membrane was vibrated and the cylinder was revolved. There was no provision for nor idea of reproducing sound. Leon Scott called this machine the Phonautograph.

The Phonautograph provided the inspiration for Emile Berliner's invention of the "Gramophone" in 1887. As a first step Berliner set up the equivalent of Scott's Phonautograph, and after recording a wavy trace upon the strip of blackened paper, took the paper from the drum and had the trace engraved as a corresponding wavy groove in a strip of metal. The strip of metal was then mounted on the drum in place of the paper and, the pointed end of a light lever being placed in the groove, the other end caused a diaphragm to vibrate when the drum was revolved. Thus, sound was recorded in a durable form and reproduced by the side-to-side or "lateral" excursions of a groove of fixed depth, as opposed to Edison's method of "hill-and-dale". At the same time Berliner recorded with the same "lateral" method upon a flat disc. In course of time he passed from engraving to the method of etching by means of acid into a zinc plate. The etched zinc plate was, of course, a "positive". From it, by a process of electro-deposition, the necessary "negative" metal matrix was made and then used in a press for moulding the final record in a thermo-plastic material. The etching process produced a groove in which there was considerable roughness, and this gave rise to "needle scratch" when the copy record came to be played on the gramophone machine. Berliner's next step got over this difficulty. Allying himself with E. R. Johnson of Camden, New Jersey, he was able to develop improved models of gramophones and, at the same time, noting that the Bell and Tainter patents for wax-cut records were about to expire, he discarded the method of etching the master record and took up the practice of cutting it in wax. From that moment the commercial progress of the gramophone with its flat disc and "lateral" groove of constant depth was such as to supersede—gradually, but finally—the

"hill-and-dale" cylinder records of the phonograph and graphophone. Some of the advantages were:

1. Simple stamping of almost unlimited numbers of records from one recording.
2. Grooves of even depth to guide the reproducing tone-arm.
3. Firmness of quality of reproduction in loud passages because the needle was positively driven both ways by the "lateral" excursions of the grooves. (Incidentally recent studies have shown how the "lateral" method with its so-called "push-and-pull" action produces less distortion than the hill-and-dale recording because of the cancellation of the even-numbered harmonics.)
4. More convenience in storage of records.

In 1898 The Gramophone Company Limited was formed in England and in 1899 the "His Master's Voice" trade mark was painted by Francis Barraud and sold to them. From these early beginnings the vast expansion of the gramophone and the disc record over the whole of the world is a matter of common knowledge. By 1925, electrical amplifiers, microphones, pick-ups and loudspeakers had reached such a stage of development that they could be used with advantage to assist in the recording and reproduction of sound on and from the gramophone disc. In 1927 discs of 16-inch diameter, recorded with the "lateral" cut but revolving at a slow speed, were mechanically coupled to the drives of cinema projectors to produce the first commercially successful talking motion pictures. Such a possibility had been foreshadowed as early as 1887 by Edison and his French-born English collaborator, Dickson, who made photographs on a glass cylinder coated with a sensitive emulsion and synchronised with a cylinder sound record.

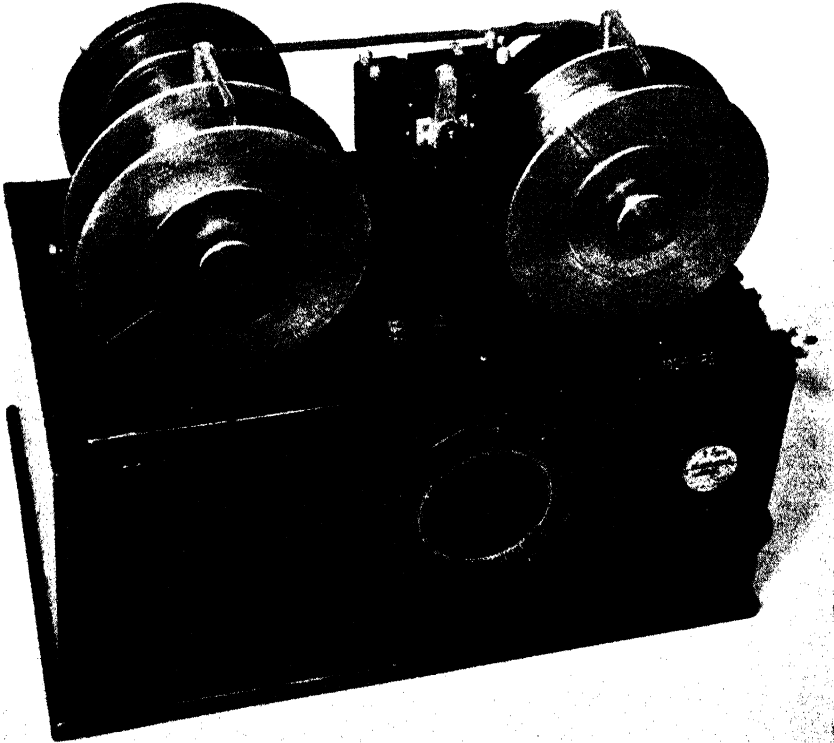
Technically the effect of coupling a disc record to a cinema projector seemed excellent, but there were practical difficulties. It was, for example, difficult to retain the synchronisation if the film broke and a portion had to be cut out. Work was therefore intensified on other known methods, in which the sound was recorded photographically and so could be printed along the edge of the motion picture film. One of the early inventors of photographic film recording was W. D. B. Duddell, who had previously made an oscillograph for the observation of alternating-current wave form. Duddell's specification of 1902 is remarkable for its foresight and technical excellence. His description, slightly abbreviated, was as follows:

"A microphone is used to convert sounds into a phonic electric current, and this variable current, or the variable part of it, is recorded by means of an oscillograph. The record is made on a moving film in such a way that the width of the part, exposed or not exposed, is determined by the deflection of the oscillograph. From the original record copies may be made by photography or other means. To reconvert the record into sounds, a beam of light is passed through the moving record and is made to illuminate a selenium cell (or photo-electric cell) the variations of which are reconverted into sounds".

In the period around 1927, this system (known as the "variable area" system) was one of those which came into commercial use. It was found to the surprise of some people, that, even with the replacement of the cutting stylus and the reproducing needle by rays of light, the photographic system of recording was not free from background noise. One source of noise was a slight damaging of the surface of the film in the process of re-winding. In the dark parts of the sound record those random

markings did not matter because the scratches were not deep enough to let the light through, but in the clear parts the light was diffracted from the irregular edges of the scratches. A method of noise reduction was invented which reduced the width of clear film through which the beam of light passed on its way to the photo-electric cell during those times when the intensity of sound was small.

In another system of photographic recording a narrow streak of light extended across the full width of the sound track, and its intensity was caused to vary according to the phonic currents: either by making these control the brightness of the



Courtesy of the Science Museum, South Kensington.

FIG. 1.—Early Model of Poulsen's "Telegraphone"

source of light or by making them regulate the amount of light admitted to the film from a constant light source by means of a "light valve". This "light valve" might consist of two parallel metal ribbons, carrying the phonic currents, whose varying attraction changed the position of the ribbons relative to one another and thus varied the gap through which the light could pass. The variable-light-source method is still used with newsreel cameras because of its simplicity and lightness, while the light-valve method is employed in talking-film studios. Both techniques yield a sound track which is of the same width throughout its course and only varies in the density of its shading, so that this system is known as "variable density" recording, in contrast to the "variable area" recording based on the oscillograph. In the variable

density system noise reduction can also be applied by arranging for a general darkening of the whole of the sound track during periods of small intensity of sound. Each system, "variable density" and "variable area", has its particular difficulties. Variable density records are subject to a wave-shape distortion which becomes appreciable at very high frequencies. Variable area records require more exactness in exposure and development in order to preserve a clean and true outline of the wave.

Turning now to the development of recording in a magnetisable body, we find that this began with an invention of the "Telegraphone" by Valdemar Poulsen in Copenhagen in 1899. Poulsen described the use of a magnetisable body as a new kind of phonograph record and alternatively for recording telephone messages

POULSEN (1899) TELEGRAPHONE MAGNETISABLE STRIP

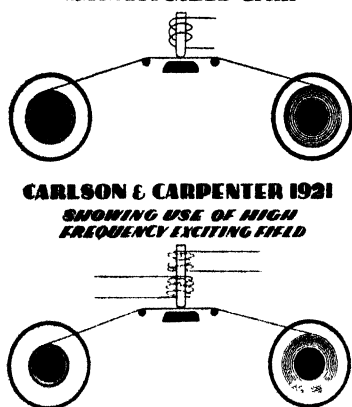


Diagram of Recording by Poulsen's "Telegraphone" and Later Use of High-Frequency Exciting Field

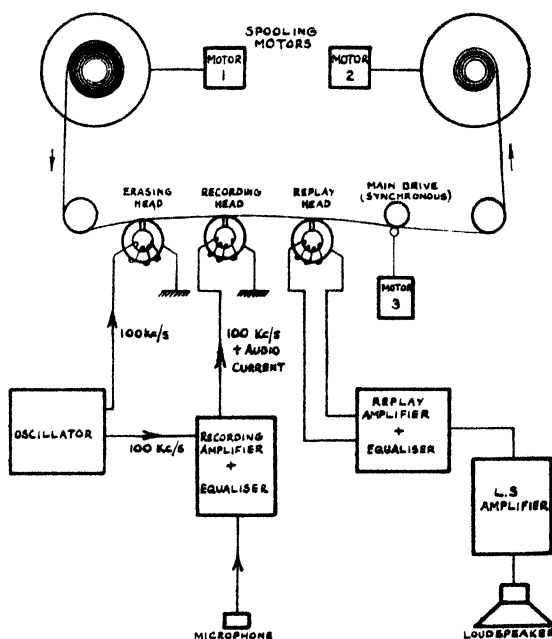


Diagram of E.M.I. Magnetic Tape Recorder 1947

automatically, and even to give a reply such as: "I am not at home, call me again at three o'clock". In the words of his patent specification:

"The invention is based on the fact that, when a body made of a magnetisable material is touched at different points and at different times by an electro-magnet included in an electric circuit, which carries electric currents varying in accordance with the vibrations of sound, its parts are subjected to such varied magnetic influences that, conversely by the action of the magnetisable body upon the electro-magnet, the same sounds are subsequently given out in the telephone (or loudspeaker) as those which originally caused the magnetic action upon the magnetisable body".

Just as Edison found that he could record sound by making his vibrating diaphragm mechanically form indentations on a moving paper tape, so Poulsen found

that he could record sound by causing his vibrating diaphragm to induce varying magnetic effects in a moving steel tape. In both cases the process was reversible for reproducing the recorded sound.

In one form of his invention Poulsen used steel tape which pressed against the poles of an electro-magnet as it moved from one drum to another. In another form he used a steel wire. It is noteworthy, in the light of further developments which I shall presently describe, that forty-eight years ago Poulsen also described the use of a strip or sheet of some material such as paper covered with a magnetisable metallic dust; and further the use of a disc of magnetisable material over which the electro-magnet might be conducted spirally. He also explained that the recording could be wiped off the magnetisable body by passing a steady current through the electro-magnet so that the same tape, wire, or disc, could be used over and over again almost without any limit. For some fields of use, such as dictating machines, this is a unique feature not shared by the cut or pressed recording disc, nor by the photographic sound record.

Subsequently in 1918 in America, L. F. Fuller used a high-frequency current instead of a steady current to wipe out the previous recording, and in 1921, Carlson and Carpenter, also in America, used a high-frequency current along with the recording impulses, to set the molecules of the magnetisable body vibrating, thus making it more easily influenced by the phonic currents. In 1929, Pfeumer in Germany worked on the development of a magnetic tape in which a soft-iron powder was mixed with an organic binding medium.

Recent development with modern technique based on Poulsen's ideas have produced methods and apparatus for magnetic recording and reproduction, which compare well with the photographic film and the gramophone disc, and which offer advantages in some special fields of use, particularly with radio broadcasting, public-address recording, and recording background music for films. Yet, until the recent war-years practical application moved along slowly. The British Broadcasting Corporation used apparatus of this type some years before the war, comprising steel tape, wound on steel drums of 2 feet diameter, weighing 11 to 12 lb., and able to run for thirty minutes. About the same time I had a number of such machines made and used for broadcasting in Australia. Special steps were taken to maintain a uniform speed of motion in the tape, and good reliable results were obtained, but they were not equal in quality to the cut disc.

For war purposes, such as recording in aircraft, machines of very small size and light weight using wire were produced in America, mainly as the result of metallurgical development done in the Armour Research Foundation Laboratories in America. In one of these machines, for example, the wire had a diameter of only 0.004 inch, and was capable of running for thirty-three or sixty-six minutes, depending on the speed, the complete spool weighing $\frac{1}{2}$ lb. Such machines were only required to reproduce speech, but, since the war, the same principles have been applied as an auxiliary fitting to a radiogramophone, and for long playing records of music as demonstrated by Mr. Hobson of Messrs. Boosey and Hawkes at The British Sound Recording Association on March 27th, 1947. This last mentioned equipment uses a steel wire of 0.004 inch diameter which has been subjected to a special metallurgical treatment. An hour's programme can be accommodated on a reel of about 4 inches

diameter by $1\frac{1}{2}$ inches thick. The frequency response is claimed to be flat within plus or minus 3 decibels from 30 to 10,000 cycles per second. (The term "decibel" is a measure of comparative loudness. Some idea of its significance can be obtained from the fact that one decibel is the smallest change in loudness which the human ear can distinguish.)

In Germany, much use was made during the war of machines developed in that country under the trade name of "Magnetophon" employing a P.V.C. tape, coated with a ferrous oxide. At times the entire programme of the German broadcasting stations was made from such recordings and the quality was good enough to confound the experts as to whether the programmes were in fact recorded or "live".



FIG. 2.—*E.M.I. Magnetic Tape Recorder*

The E.M.I. Magnetic Tape Recorder (which was here demonstrated) was specially designed and made in England for use in broadcasting stations and film studios. It employs the basic principles already mentioned but it embodies a considerable amount of technical and mechanical development. It is, I believe, the first complete and commercial British machine of this type to be demonstrated before any learned society and it has gained interest among visitors from overseas countries.

The tape consists of a base of cellulose acetate two thousandths of an inch thick and one quarter of an inch wide, coated on one side with finely divided ferric oxide in a particular physical form (gamma). The spool of tape weighs one pound, has a diameter of $11\frac{1}{2}$ inches when wound up, and plays for twenty minutes. The tape passes over three magnetic heads. The first head erases the recording if and when desired and prepares the tape for fresh use. When in action this "wiping" head is energised by a current of 100 kilocycles per second. The recording head carries

the phonic currents and a magnetic conditioning current at a frequency of 100 kilocycles per second. The third head is for reproducing, and into it phonic currents are induced by the magnetised tape during replay. The recording and reproducing characteristics of this equipment are flat within two decibels from 30 to 10,000 cycles per second and are therefore well adapted for faithful reproduction of complex musical sounds within range of the average human ear. The range between the quietest sounds and the loudest can be as high as 60 decibels, which would correspond to the difference between very loud radio music and the average whisper 4 feet away. The complete ensemble is designed on correct engineering lines with modern styling.

There was also exhibited a small portable machine for recording and immediately replaying speech, using pliable 10 inch diameter discs which are coated with ferric oxide. The discs for this can be readily folded, inserted in envelopes, and sent by mail. They have a recording time of three minutes. The recorder is battery operated and the discs are rotated by a spring motor; the recording equipment is therefore transportable and entirely independent of electric supply mains. An office-type reproducer which operates from the electric mains is also exhibited for use with these pliable discs. The portable recorder is particularly adapted for travellers who wish to make short reports or mail brief letters to a distant office for direct listening by the addressee or for transposing on to paper by a typist. A similar combination can be used as a convenient form of dictating machine.

Turning again to the topic of photographic film recording and considering where it stands to-day, it seems that both the variable area and the variable density systems have their different and characteristic techniques. These call for great precision in mechanical, electrical, optical and photographic work. So much care has been taken by people working in these fields that the quality of sound recording and reproduction with the latest equipment is sufficiently high to defy criticism by any but the most critical technician. The technical standard can be expressed roughly by saying that recording is carried from 50 cycles per second up to 10,000 cycles per second, with a variation of not more than 5 decibels in the laboratory control copies, and a ratio of maximum music level to noise of about 40 decibels using noise reduction methods, although with extreme care in recording and using the very latest reproducing equipment it is possible to get a volume range up to 55 decibels. The most recent advances are concerned with removing certain causes of noise and distortion, particularly those which arise because the film does not move past the photo-electric cell with a perfectly uniform motion. For example, because of the sprocket and sprocket-hole method of drive there is produced in the film a so-called "flutter" at 96 cycles per second. In the R.C.A. Photophone equipment, by introducing additional mechanical filtering in the film-drive mechanism, by combining magnetic drive and damping rollers, achieving what is known as "tight loop", low and high-frequency flutter and 96-cycle flutter have been reduced to a negligible quantity, and total "flutter" for all frequency bands is not greater than ± 0.05 per cent.

In the Western Electric system steps are taken to confine the effect of "flutter" to a selected band of frequencies and then to filter it out in the circuits of the sound-reproducing equipment. Also in the Western Electric system, noise caused by grain in the film is reduced by making the original recording on a track which is twice

normal width ; in subsequent processing on to the working copy the track width is reduced to normal. These various advances represent crowning achievements in a long line of advance towards perfection in photographic film recording and reproduction.

I now return to cut-disc recording for the purpose of showing what is being done at the present time and how it compares with other methods.*

The E.M.I. portable high-fidelity recording equipment, type 43, which was also exhibited (Fig. 3), is suited to conditions where artistes cannot be brought to permanently equipped studios but have to be recorded by mobile expeditions

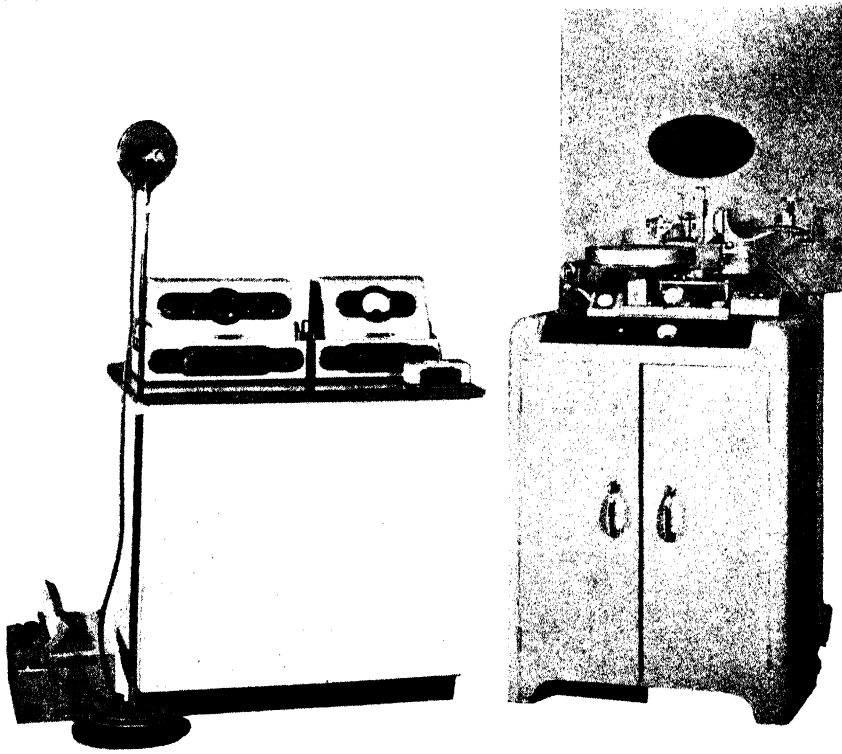


FIG. 3—*E.M.I. High-Fidelity Lacquer and Wax Disc Recording Equipment, Type 43*

travelling sometimes many hundreds of miles. The whole of this equipment is made so that it can be easily packed for rough handling. Its parts are as robust and as accessible as possible and the recording head has a comparatively high sensitivity in order to minimise the dimensions of the amplifying apparatus which has to work it.

* A demonstration was then given as follows :—

- (a) Early hand-driven Berliner machine with record of 5½ inches diameter.
- (b) Early commercial horn-type gramophone with record of 7-inches diameter.
- (c) Folded-horn type gramophone of 1927 with 12-inch records, first acoustically recorded and secondly electrically recorded.
- (d) Latest electrical reproducer (H.M.V. Type 3000) with records from current production.

It is suitable for recording on solid wax blanks, on wax-coated glass discs (known as flow-coats), or on a tough cellulose nitrate disc with an aluminium core (known as a direct-recording blank). At the input end is a microphone, amplifier and mixer point to which up to four microphones may be connected and the output from each separately adjusted. In practice an assortment of microphones of different characteristics is used.

Then there is the main and output amplifier with an output of 10 watts. The recording cutter-head which was shown was a recent development of the type devised by the late A. D. Blumlein of E.M.I. Research Laboratories. The frequency characteristic of this type is flat within plus or minus 1 decibel over a range of 250 to 10,000 cycles. Between 10,000 and 12,000 cycles the characteristic falls by 3 decibels after which it tails off fairly sharply. Below 250 cycles the characteristic falls by 6 decibels per octave down to 30 cycles per second. This gradual reduction below 250 cycles is arranged deliberately because in a disc record, for the same sound intensities, the amplitude of excursion of the groove varies inversely as the frequency. Thus, at the low frequencies, there is a risk of one groove cutting into the next. By a simple adjustment in the circuit of the electric pick-up this attenuation of the lower frequencies can be accurately equalised. A reliable figure for the ratio of music level to noise in the finished record pressing is 45 decibels. With pressings of special material a ratio of 55 decibels can be obtained. The figure of 45 decibels is also exceeded with loud passages which are often recorded in practice above the normal level.

Excellent recordings have been made in the past with equipment having an upper limit of about 6,000 cycles and there has been much debate as to the practical advantages of going much beyond that point. In February, 1944, at The Institution of Electrical Engineers in London, Dr. G. F. Dutton assisted by W. S. Barrell demonstrated disc recording up to 12,000 cycles in competition with recording by photographic film which had been made simultaneously. It would be fair to say that the opinion of the audience was that both types were the best of their kind which had been heard up to that date, that the disc recording had less surface noise (apart from a few occasional clicks) and that while the film record had an excellent all-round quality of sound the disc recording had better qualities of "transient" response. This last quality was demonstrated particularly in the cymbal clashes. In metallic percussion instruments having rich but transient overtones these higher frequencies are particularly noticeable. However, rather than argue for and against arbitrary limitations or advantages, it would be wiser, for the sake of the transient pulses as well as the musical tones, to reproduce the whole frequency range to which the ear responds and in order to achieve that effectively, the equipment should be capable of responding in those regions called supersonic where the frequency is so high that the hearing faculty cannot detect it.

In a somewhat later type of E.M.I. recording-head the frequency range has, therefore, been extended just into the supersonic range, that is to say, up to 20,000 cycles per second. Sir Ernest then demonstrated a recording made with such equipment of certain orchestral instruments which are particularly rich in transients and the higher frequencies, namely: a Glockenspiel, a side drum, a tambourine, and castanets. Each instrument was recorded for purposes of comparison, first with

a top cut-off at 5,000 cycles per second, and second, with a frequency range opened out to at least 20,000 cycles per second. So far as is known, this was the first time such a range had been demonstrated with any commercial system of sound recording in any country.

For the recording services required by broadcasting authorities a different specification is called for, and it is exemplified in the high-fidelity recording equipment type D designed by the recording engineers of the B.B.C. for use with direct-recording lacquer discs playing up to 15 minutes a side.

These discs are similar to those which were used in 1927 in synchronism with talking films, but with the important difference that after recording they can be played back immediately, without the need for any further processing in the factory. With suitable pick-ups of light weight they may be played as many as twenty times without serious deterioration. If a number of copies are wanted for distribution to

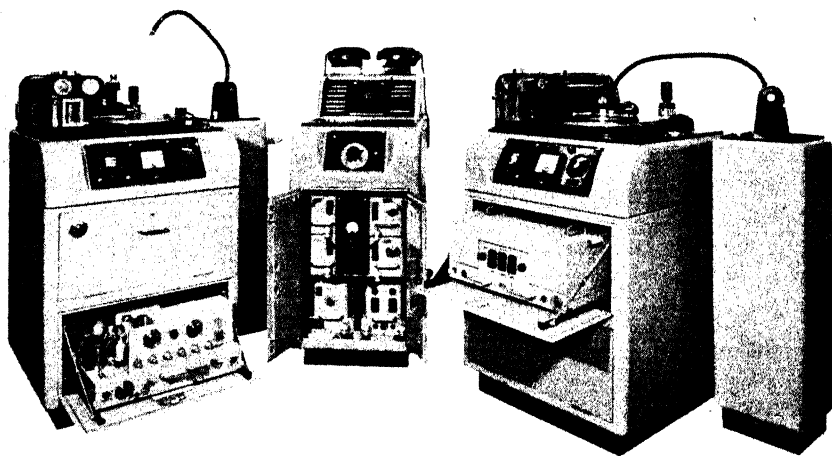


FIG. 4.—B.B.C. High-Fidelity Lacquer Disc Recording Equipment, Type "D"

other broadcasting stations, they can be processed in a record-pressing factory and copies made, usually in a thin tough plastic material suitable for transport by air. This broadcasting equipment is designed for recording a continuous programme and it therefore has a number of useful automatic features including push-button operation.

Although so far I have described recording and reproducing mechanisms and equipment, it would be wrong to exaggerate the part they play in producing gramophone records of the world's great artistes for sale to the public. The procedure in making such records is very different from that in conducting a platform performance or a broadcast. In the process of recording, the performing artiste has in mind the production of a certain artistic result not only for home listening but for repeated and attentive listening by critical ears, including those of his own professional colleagues. He is producing something by which he will be judged for many years to come. In the recording studio he therefore works with a body of specialised

technicians, who have many years of experience who are musically sensitive and skilled in helping the musician to obtain the result at which he is aiming. Under such recording conditions it is, of course, possible to make any number of tests and play each one back immediately to the artistes. After all rehearsals and tests are completed, the usual practice is to make records, or "masters" as they are called, of three separate performances so that the artiste and the experts may consider and compare all three at leisure. Only after the most exhaustive consideration is the final record decided upon for public issue.

To sum up the position reached for each of the various methods of recording and their different advances:

- (a) The disc provides music which can be chosen at will and played on simple instruments in one's own home. It has further uses such as in broadcasting, and subsidiary uses such as the recording of the Nuremburg trials.
- (b) Through the medium of film recording millions of people are entertained every day all over the world by the photographic film record synchronised with the motion picture.
- (c) With the iron wire method new advances are being made but its actual use to date is limited to the dictation of speech and the recording of radio programmes in the home (and, as to the latter, questions of copyright will arise in some countries).
- (d) The magnetic tape method used in Germany for recording broadcast programmes during the war is only just beginning to come into general use. This method and possibly the iron wire method will be extended considerably in the next few years.

In conclusion I should say that the gramophone industry is sometimes accused of holding back the development of sound recording methods on film and on tape, etc., in order to protect their supposedly large investments in the disc manufacturing business. On the contrary, the biggest companies both here and in America are spending large sums in research and development on these relatively new advances which will not, in my opinion, take the place of the disc record. Perhaps a few years hence we might see new designs of gramophone instruments which can play either disc or tape (or wire), the disc having the great advantage of being easily mass-produced especially for popular selections and musical subjects which have a duration from $3\frac{1}{2}$ to $4\frac{1}{2}$ minutes, and can be selected as desired. Tape and wire require, of course, such or other special machines from which they can be played. They will be useful in the gramophone field for the comparatively limited market which requires production of a full symphony or opera without the mechanical or manual changing of the records.

I wish to acknowledge much expert and valuable assistance in preparing this lecture and particularly in arranging the demonstrations from:—

Mr. B. E. G. Mittell, managing director of E.M.I. Studios, Ltd.

Mr. W. S. Barrell, E.M.I. Studios, Ltd.

Mr. J. M. Hughes, E.M.I. Studios, Ltd.

Dr. G. F. Dutton, E.M.I. Engineering Development, Ltd.

Mr. E. M. Payne, E.M.I. Engineering Development, Ltd.

Mr. W. E. Lord, E.M.I. Factories, Ltd.

DISCUSSION

THE CHAIRMAN: I am quite certain everybody in the room will agree when I say that this has been one of the most enthralling explanations of a highly intricate subject.

I was very interested in what Sir Ernest said about the recording of supersonic sound. This reproduction is perhaps something we have to take seriously. Certain instruments have overtones, which are what most people would call supersonic. They are not reproduced by the ordinary gramophones or wirelesses or anything of that sort, and therefore they are ignored, but if we are going in for "high fidelity reproduction" which is talked about so much in the United States, they have to be grappled with. With a certain type of station it is going to be easy to handle this sort of frequency; but to what extent is it an advantage? I am not trying to start a well-worn argument as to whether the usual kind of "high fidelity" is really worth while; but rather, is anything to be gained by going further than that and reproducing supersonic frequencies? I think all the frequencies which most people can hear now are necessary. However, if some of those, which have never been reproduced, and for which, incidentally, the music is not written, are reproduced, does it mean re-writing the music?

The organisation with which I am connected is the B.B.C. and of course broadcasting has now got an enormous use for recording. This really started as a result of world-wide broadcasting, where one must take account of time differences.

Recording has been developed in the B.B.C.—rather excessively perhaps—to such an extent that we now cut, I think, something like 5,000 discs a week. So I suppose we are the biggest cutters of discs in the country, including even the distinguished firm to which Sir Ernest belongs.

We have used almost all the systems of recording which have been referred to this afternoon, with the notable exception of one, the ordinary photographic method of film recording used by the talkies. That one is not suitable for broadcasting.

We started recording on ordinary disc records, not using wax, but an acetate coated metal disc, and this is still used more than any other method. The next method was, roughly speaking, the Poulsen method, and then we went to another method not specifically named, the Philips Muller method, half mechanical and half photo-electric in its nature. This makes a film, but the sound track is cut mechanically, and reproduced by a light cell. We have now passed on to the latest craze, the magnetophone, and no one in our organisation will take any interest in anything else.

SIR MALCOLM SARGENT: I feel that rather an important point has arisen between the Chairman and the Lecturer. As a musician, and not a technician, I would like to say I am not sure that we know how high the human ear can hear. I feel convinced myself that overtones from notes are heard by the ear and are not heard as pure tones. Therefore you have to isolate the overtones from the note concerned to say if you heard them or not. This means that the distinction between a refined ear hearing, for example, an oboe, as against an unrefined, is the subtlety with which he can receive in his hearing the overtones which cannot be isolated or measured. Therefore I am convinced Sir Ernest is right in saying we must go much further in the number of cycles used than can be heard nakedly by the human ear if we are to get true reproduction.

Much as I admire the investigations so far done in the mechanical reproduction of sound, I am convinced that every person in this hall, having heard the piano record, first-class as it was, and having heard a real pianist present, with eyes shut would have known instantly which was which. There is something subtly different; it is something so far not measured with our ears.

I have always had a theory myself with regard to hearing which I have not found contradicted by scientists, that we have not really got as far in hearing technique scientifically as we have in seeing. The oculist will give you a pair of spectacles which will correct or focus, but we have not yet got people who can do that equally well for hearing. I have a great desire that something shall be done about it. A slightly deaf person should be able to go to a scientific consultant who would give him an appliance which

would supply things missing in his hearing—missing vibrations being mechanically dealt with. The Corti's organ in the ear is a thing which I believe can focus. That is not accepted by medical practice, but they admit they cannot contradict it.

You can hear—I can hear, if I wish—in the full orchestra, what the second oboe is up to. I do it repeatedly: if he is faulty it worries me, because I can hear nothing else but the bad tones coming from him. If you do not know how to isolate this sound, it does not worry you in the least. As a conductor, I know one thing you have to avoid is listening to the worst player in the orchestra, or otherwise you have an awful time throughout the concert! The fact that you can listen to the worst player in the orchestra means you can *focus* your hearing, as you can focus your eyes.

Dr. G. R. COOPER: I think Sir Ernest has stated he feels that a hill and dale recording is not quite so efficient as a lateral cut. The tendency in the United States has been to regard the reverse as being the case. They feel there is more scope in hill and dale than in lateral recording, and I would like to hear the lecturer's views on this.

Secondly, with regard to the sound pick-up from the standard discs, we are told that the ideal, according to the modern theory, is to aim at a light-weight pick-up; but then with a fairly heavy recording, we get rather annoying chattering, and have to anchor the pick-up down in order to keep it on the record, thus increasing record wear. Once we do this beyond a certain point then the record becomes rather unpleasant to listen to. Has any development been made or aimed at to change this tendency?

My third point concerns the question of loudspeaker efficiency. I think that the average domestic radio receiver loudspeaker has an efficiency of something of the order of 3-5 per cent., with 10 per cent. when you get into the super, of £100, class of machine. Has very much work been done on loudspeaker efficiency? Obviously, the greater the efficiency of the loudspeaker, the less complex and the less expensive to run will be the amplifying apparatus associated with the equipment.

My final question is on stereophonic sound. This is probably rather outside the scope of the present paper, but it is one of the things that has been touched upon by the cinema people during the past seven, eight or nine years. There have been violent arguments as to which method is going to be the best, and whether two tracks or more will give the best reproduction. I shall be very glad to hear any remarks Sir Ernest has to make on this.

Major H. MACCALLUM: It is well known that it is the presence of the higher frequencies or harmonics that give a characteristic quality or *timbre* to different musical instruments and voices. It is also well known that above an upper limit the ear is incapable of responding and we enter the supersonic range. It seems to me to be of practical as well as of scientific interest that we should know if the upper limit of audibility for a pure sine frequency coincides with or differs from that at which the quality of a mixed frequency note is no longer affected.

My own impression is that the quality is affected by the presence or otherwise of supersonic frequencies and, if I am right, we must design to embrace an adequate portion of the supersonic range if we are to achieve perfect reproduction. It will be realised that I am suggesting that the ear can respond to inaudible sounds when they are mixed with and, as it were, carried on the back of an audible sound. Is this so? I wonder if Sir Ernest can enlighten us on this point. Further it has been my experience that people must be educated to appreciate good reproduction. We have heard some wonderful reproduction this afternoon; but I think it was perhaps a little too good for some of us.

Mr. D. T. BENNETT: We are all blest with two ears, which give us binaural or stereophonic hearing. It seemed to me that the best of reproductions coming only from a small corner could never under any circumstances represent an orchestra.

I would ask Sir Ernest if he could make a small comment on any efforts that may have been made towards a binaural reproduction of sound.

THE LECTURER (Sir ERNEST FISK): I am afraid we have got into esoteric realms, or

at least into philosophy. You yourself, Sir, led us on a good deal in talking about super-sonics, but coming down to earth, you did mention the Philips Muller, which I did not include in my lecture. That is a very good system. It is somewhere between the photographic method and perhaps the Poulsen method, with its own unique qualities. I am afraid I cannot say any more about it, at the moment, except that it must be good or it would not be used by the B.B.C.

Sir Malcolm Sargent took us also into the question of supersonics. I was very interested in what he said, particularly when he spoke of focussing the ear. He told us quite frankly that expert people, presumably physiologists, do not believe you can focus the ear, but I might perhaps suggest to Sir Malcolm that one might focus one's mind, and thereby select from what the ear is doing certain particular things that the mind is concentrating on.

Dr. Cooper has raised a number of interesting questions. First there is the very difficult one for me, this terrible fight of hill and dale versus lateral cut records. All I can say—because, as you know, I have not the time and probably not the ability to go into these minute technicalities—is that there are differences of opinion, and I know the great Western Electric Company and particularly the Bell Laboratories have a great belief in hill and dale. We in the gramophone industry, as we choose to call it, have an equally great belief in the lateral cut.

Some years ago some of our experts went especially to the United States to investigate this hill and dale system. All I can say now is that the gramophone industry not only here, but in the United States, where we have to make these things in many millions, believe the lateral cut is superior for our purpose to the hill and dale.

As to the question of light-weight and heavy-weight pick-ups, I am afraid this leaves me in the same kind of dilemma. However, for the conventional gramophone, which has to be supplied to the public in large quantities, and which has to give them, so far as we can judge, the best reproduction with the least trouble, we believe in the light pick-up. We are having another interesting problem in that field to-day, because so many people believe the final answer in pick-ups, particularly light-weight ones, is the use of the sapphire needle or sapphire point. However, just as we are beginning to go seriously into that and spend large sums of money, we find some of the greatest advocates of the sapphire point are now coming back to steel needles.

Stereophonic sound interests everybody. The late A. D. Blumlein developed this in our laboratories. His method was to record one side, or one ear, of a disc record, with lateral cut, and the other side, or other ear, on the hill and dale cut, with, of course, the microphones suitably separated, and he played the record on two reproducing instruments, also suitably separated, and although I have not heard it (I was enquiring for it last year, but I find, like many other things, it disappeared during the war) I am told by those who did hear it that it was very realistic. If you heard someone tearing a piece of paper, you knew he was tearing a piece of paper.

Stereophonic reproduction and recording is to-day merely a matter of technical engineering, but it is obvious to us all it is not being widely used. There are probably several reasons for that: not many people want it, and still fewer people are prepared to pay for it, because it must be much more expensive both in recording, in the record itself, and in the reproducing apparatus.

Lastly, it is probably true that lots of people do not like high fidelity recording and reproduction. Some experiments were carried out a few years ago by the Columbia Broadcasting System in America, in which they invited the general public to come in and listen to recordings and reproduction which went up to high frequencies and supersonics, and also to the so-called normal recordings which did not. Their reports showed the public preferred the recordings without the highest frequencies. Someone has suggested that this is because broadcasting (of course not in this country) has given people what are called "tin ears".

After a vote of thanks to the Lecturer and to the Chairman had been carried with acclamation, the meeting terminated.

THE GROWTH OF THE PRESS IN ENGLISH IN INDIA

By SIR ALFRED H. WATSON

SIR GEORGE BIRDWOOD MEMORIAL LECTURE

India and Burma Section, Thursday, January 8th, 1948.

Colonel The Hon. J. J. ASTOR, *Chairman of The Times Publishing Company, in the Chair*

THE CHAIRMAN: I should like to say that I greatly appreciate the invitation to take the Chair at this Sir George Birdwood Memorial Lecture and that it is also a great personal pleasure to me to support my friend Sir Alfred Watson on this occasion. He, of course, is a journalist of long and wide experience in many of the capacities that that profession offers. From 1925 to 1933 he was Editor of *The Statesman* in Calcutta and so he has personal experience of the Press in India in recent years, and it is natural that he should have studied closely its history and growth. I have very much pleasure in calling upon him to address you.

The following paper was then read:

Any account of the British-owned Press in India must be of the nature of an obituary. A far from ignoble chapter in the history of journalism is closing. One by one, and latterly, at an accelerated pace, the journals whose names are familiar to Englishmen who have never been in India have passed under Indian control. Although the position is veiled it is doubtful whether more than one of the greater dailies published is wholly British-owned. In some cases British editors and British members of the staffs remain. There is still some proportion of British capital, but the final power of direction is Indian. Perhaps that is not matter for regret. As in other fields of human endeavour the Englishman in India has been the pioneer of a free Press. He has been the educator, and now can watch the harvest of his endeavours.

If journalism in India has owed much to the English trained man who has worked in its offices, English literature and public life have gained no little from the men whose chief training has been upon the British newspapers published in India. From James Silk Buckingham, whose career in the House of Commons dates back to the first elections under the Reform Act of 1832, to the present day, when the former editor of the *Times of India*, Sir Stanley Reed, contributes to its debates, there have been only short periods in which writers for the Indian Press have not filled seats in Parliament. To English literature Indian journalism has given the great figure of Rudyard Kipling; to the English periodical Press; Meredith Townsend, long editor and proprietor of the *Spectator*, and to education and literature Dr. George Smith, who worked with and succeeded Townsend in the editorship of the *Friend of India*, the paper founded by Marshman at Serampore.

To-day there are published in India, over 18,000 newspapers and periodicals; 3,400 in English, the remainder in the many vernaculars. All this tremendous flowering has come from the tiny seed originally sown by John Augustus Hicky, described by one writer as "a worthless man, but the pioneer of the Indian Press". *Hicky's Bengal Gazette*, published in the early 1780's has been truly enough described as "scurrilous and slanderous" and his writings first landed him in

prison, on the suit of Warren Hastings, and later led to the confiscation of his type, but reading his journal to-day one may feel that his victims were unduly sensitive. The manner of writing in much of the British journalism of his time was less remarkable for restraint than in these days, and Hicky did little more than add spice to a style common elsewhere.

Against the application of the standards of his own day to conduct in the past the historian and the publicist needs to be constantly on his guard. Having regard to the fact that most of his shafts were directed against Hastings and Sir Elijah Impey, and never aimed at Philip Francis, it is possible to conjecture that Hicky was one of the many inferior instruments in the hands of the enemy of Hastings.

Naturally enough the first journals were published in Calcutta, chief of the Presidency towns, for there alone was a British population adequate enough to provide a paying circulation. Most of the early newspapers were wholly designed for the British reader. With possibly one exception they were viewed with no kindly eye by the rulers of those days. A rigorous control was exercised until 1818, and the Marquis of Wellesley, impatient of criticism, appointed an official censor, to whom everything had to be submitted before publication. The exception was the *Calcutta Gazette*, started in 1784, under the patronage of Government, and still surviving as an organ for all official notices. Among the first to take advantage of the relaxation of restriction was Silk Buckingham, whose *Calcutta Journal* appeared in 1818.

Buckingham was of a different stamp from Hicky. As his subsequent career was to prove he was a reformer, almost a fanatic, and when John Adam, during his term as temporary Governor-General, suppressed the *Journal* and expelled its editor he had under-estimated the man with whom he had to deal. Buckingham came home to pursue his claim against the East India Company, to secure from a Select Committee of the Commons a recommendation for redress, and ultimately to obtain from the company a pension of £200 a year. A memory of him survives to this day in that he was the founder in London of the *Athenæum*, of which journal he disposed in the year in which it had started.

Journalism is apt to be infectious. Hicky's venture was followed by a number of others, few of which had long existence, but the *Indian Gazette* survived for over half a century before, in 1833, it merged into the *Bengal Harakaru*, a paper now forgotten, but of real significance in its day, before it in turn was absorbed into the *Indian Daily News*, which ceased to exist in comparatively recent times. None of these early ventures had the significance of *John Bull in the East*, founded in 1821 by a syndicate of British merchants with the deliberate intention of setting an example of moderation in the tone of the Press. Later the name of this journal was changed to that of the *Englishman* by the then editor, Stocqueller, who elevated his journal into the most authoritative paper in the East. Stocqueller was a man of many activities. At the same time he was editing the *Bengal Sporting Magazine*, the *East India United Service Magazine*, and the *Indian Racing Calendar*.

It was at the press of the *Englishman* that the essays written by Macaulay while in India were first set in type, although Macaulay, it has to be admitted, had a low opinion of Indian journalism. That feeling was fully reciprocated, and perhaps justified in Macaulay's eyes, in the attitude of the press towards him. With the characteristic frankness of those days we find the *Calcutta Review*, one of many

ephemeral publications, saying "Macaulay is not a man of simple manners, and we leave it to others to say what traces of hospitality, benefit, kindness or large disinterestedness he has left behind him" and comments on his address from the chair at the St. Andrew's Dinner that "he made one grand artificial sounding brass and tinkling cymbal kind of speech". The *Englishman* was to survive almost to the present time. Three generations of the Saunders family owned and edited the paper until, in the 'twenties of this century, it was acquired by the Knights, the proprietors of the *Statesman*, and some ten years later was finally merged in that publication.

Bombay comes later into the newspaper field than Calcutta, although there is a record that a printing press was set up there as early as 1674. The first newspaper the *Bombay Herald* was founded in 1789 and was quickly followed by the *Bombay Courier*, which maintained an independent existence until 1861, when it merged into the *Times of India*. Once started in newspaper production Bombay became a veritable cockpit of journalism. Many of the early journals had but a brief life, frequently succumbing, like their counterparts in Calcutta, to the powers of the government to suppress them and deport their proprietors. For their contents, Captain Stocqueller, who was subsequently to figure so largely in Calcutta, expressed his contempt and showed it by acquiring a small paper which he transformed into the *Bombay Chronicle*. That had only a brief life, for its editor returned to England in 1822, to come back and again embark in journalism in 1827, with a paper called *Iris*, which enjoyed so great a local success that it was amalgamated with the *Courier*, of which Stocqueller became editor. So violently did he attack, in its columns, the rival *Gazette* that a duel was fought between the two editors, his rival being described by Stocqueller as "a pugnacious retired Mariner". Things became more quiet, as one can believe, when Stocqueller transferred his activities to Calcutta.

One would be giving a wholly false impression of the tone of this early Indian journalism if it were assumed that it was uniformly scurrilous and belligerent. On the contrary much of the writing in its columns was serious and weighty, devoted to the many problems that the new governors of India were encountering. Among regular contributors were many of the higher officials of government, which had not then imposed the embargo, which came much later, on communications to the newspapers. The *Bombay Courier* counted amongst its regular writers Mr. Elphinstone, concerned with native education, Sir Alexander Barnes and Sir Henry Rawlinson. In the 'sixties of the century, the *Bombay Gazette* had as regular contributors Sir Alexander Grant, Sir Bartle Frere, Mr. Lockwood Kipling and Sir George Birdwood, whose memory we honour to-day. Could the records of the Calcutta and Madras journals be diligently searched it would be found that they were not behind-hand in calling upon the abundant experience and wisdom to be found in the servants of government. So early as 1835 Fontanier, the French Vice-Consul at Basra, was contrasting the balance, judgment and talent shown by Indian newspapers as compared with the European press in general.

A like tribute would certainly be deserved by the Bombay journals of the immediately succeeding period. Dr. George Buist, described by a contemporary as "India's foremost man of letters" and "a thoughtful and enterprising man of science" had been brought from Scotland in 1840 to edit the *Bombay Times*, and to remain in that chair until 1857, when differences of opinion with the proprietors regarding the

mutiny led to his resignation and his subsequent starting of the *Bombay Standard*. His second venture cannot have had much success for it was amalgamated with the *Bombay Times* in 1860. On the *Times* he was succeeded by Mr. Robert Knight, during whose editorship, and after the absorption of the *Bombay Courier*, the title was changed to the *Times of India* under which it is issued to this day. I shall have more to say of Knight as we return to Calcutta. Suffice it to say of the impression he had made on the Indian mind that on his retirement from Bombay he was made the recipient of a gift from his India admirers of a lakh of rupees, a thanksgiving offering for the zeal with which he had championed the Indian cause in the difficult days after the mutiny.

In the 'sixties and subsequently the *Times of India* had serious rivals. Mr. J. M. Maclean, a journalist of proved ability who in subsequent life was to become M.P. for Cardiff, President of the Institute of Journalists, a knight and twice the recipient of the medal of the Society of Arts, came out to edit the *Bombay Gazette* and shortly afterwards to become its proprietor. In the twenty years during which he was responsible for its policy he made it an organ of serious and sober opinion, exercising a powerful influence both upon local and national policies. Ultimately, the paper was sold to Mr. Grattan Geary and after his death was acquired by a Bombay syndicate.

This was the period also when purely Indian journalism in the English language began to find its feet. In 1855 Harish Chandra Mukerji, rightly described as the first native journalist of note, had started his editorship of the *Hindu Patriot* in which he was to display a literary ability, a grasp of public affairs and a fearlessness in their handling that have left him an enduring and honourable name in the annals of journalism.

Of the subsequent years in Bombay there is much to be said that cannot be brought within the limits allowed this afternoon. Papers came and went, especially after 1885 when Indian demands for political power became organised and articulate. The unsuccessful, whether in English or the vernaculars, quickly died. The successful frequently changed hands, but the *Times* remained the outstanding organ in English. After more than one change of proprietorship it passed into the strong hands of Bennett, Coleman & Co., who showed outstanding enterprise in its development, and in the furthering of illustrated journalism in India. To this period belong the editorships of Sir Stanley Reed, Mr. Samuel Sheppard and Sir Francis Low. Almost simultaneously with the change of government in India the entire holding in its shares has been acquired by Mr. Ramkrishna Dalmia, a Marwari industrialist and philanthropist. Among other outstanding men who served the *Times of India* mention must be made of Mr. Lovat Fraser. His friendship with Lord Curzon, during the vice-royalty of the latter, enabled him to write with almost unique authority and force. His subsequent career in the service of Lord Northcliffe, when the latter owned the *Times* is part of the history of London journalism. Let me here record the surprise and indignation with which Mr. Geoffrey Dawson, then editor of the *Times*, told me on a visit to India that everybody spoke of his paper not as *The Times*, but as the *London Times*.

In its beginnings journalism in India was naturally enough confined to the Presidency towns, but in the 'thirties of last century it spread to the mofussil, and the *Mofussilite*, published in Meerut, enjoyed considerable prestige. It was ultimately

to be absorbed into the *Civil and Military Gazette*, first published at Simla in 1872, and subsequently transferred to Lahore with, as tradition has it, a short sojourn at Karachi, where the *Sind Gazette* was subsequently born, and had as one of its proprietors the father of two late Victorian writers in "Lawrence Hope", a minor poetess, and Victoria Cross. Were it alone for the association of Rudyard Kipling with the paper and with the *Pioneer*, which became linked in proprietorship, these two newspapers would hold a distinctive place in the story of Indian journalism. Men have gone to the offices in which Rudyard Kipling worked as to a shrine. His contributions to these journals, later published in slight paper-backed volumes have assumed a permanent place in English literature. Of the editor who gave him his first chance, Kipling has written, "What he suffered on my account I cannot tell, but the little that I ever acquired of accuracy, the habit of trying at least to verify my references, and some knack of sticking to desk-work I owed wholly to Stephen Wheeler".

But the two papers had an importance beyond the fact that they were the nursing ground of genius. Under the proprietorship of Sir James Walker, Sir William Rattigan and Sir George Allen, and with George Chesney as editor at Allahabad, and Howard Hensman alternating between Calcutta and Simla, the *Pioneer* attained something like primacy among the journals of India. Through Howard Hensman it was in the closest touch with the government at the centre, and spoke with an authority such as gave it over a considerable period an importance far outside India. In England for many years those who knew little else of India regarded the *Pioneer* as the authentic voice of the British in that land.

In association with the *Daily Telegraph* of London it initiated into journalism Winston Churchill, who acted as war correspondent in the Malakand campaign of 1897. Also on its staff at one period was Maitland Park, to become subsequently famous as Sir Maitland Park of the *Cape Times*.

The day was to come when a journalist straight from Fleet Street, imbued with the ideas of the new journalism, believing that they were applicable to Indian conditions, and holding that a certain amount of the scurrility of earlier days would be a good thing found himself in the editorial chair. That was the beginning of the end. Presently the *Pioneer* passed to a syndicate of talukdars, who have been wise enough to leave control in the hands of an English editor of a different stamp. Allahabad also gave birth to the *Indian Leader*, the chief organ of the almost defunct Indian Liberal Party, brilliantly edited by the late Sir C. M. Chintamani, who was to hold high office in the Montagu-Chelmsford era. Another venture, very short-lived, was the *Indian Herald*, edited in 1879 by Marion Crawford, subsequently author of the "Cigarette Maker's Romance".

Nothing has so far been said of Madras. Yet that province was not far behind Bombay in embarking upon journalism, and to-day has the distinction of producing a greater number of newspapers and periodicals in the English language than any other province of India. That is not so remarkable as it may seem, since Madras was an early and active field of missionary effort, and wherever the missionary went he carried the printing press. Madras journalism has had few of the vicissitudes that have attended it elsewhere. The *Madras Times* in the 'seventies of last century was owned by the Digbys and edited by an able journalist of previous English

experience in William Digby, who returned to this country to become the first secretary of the National Liberal Club and an unsuccessful candidate for Parliament. But in later times the *Madras Mail* has been the representative organ of British opinion in Madras. Of late years it has had a formidable competitor in the *Hindu*, under the editorship of the Srinivasans, father and son, two of the ablest journalists that India has produced. Of the *Hindu* it may truly be said that of all the Indian-owned journals it is most akin to the British conception of what a newspaper should be in the quality and quantity of its news, in the balance of its writing and in its mechanical production. In Madras, too, Miss Annie Besant ran for several years her paper, *New India*, a nationalist organ, while from the press of the Theosophical Society came a large number of periodical publications in English.

Turning back to Calcutta, we see the beginnings of the press in Indian languages in the *Samachar Durban*, the enterprise of the missionaries Marshman, Ward and Carey, a paper so appreciated by government that the Marquis of Hastings allowed it to circulate through the post at one-fourth the usual rates. It began publication in Bengali in 1818. At a much later date the missionaries started the *Friend of India*, a paper that holds a distinctive place in the story of journalism. Edited by the son of the first Marshman, he brought out to Calcutta a youth of seventeen years of age, Meredith Townsend, who at twenty-one was to assume full editorship of the paper, helped by Dr. George Smith, who later succeeded to the editorship.

The missionaries can have had little regard to what Townsend was writing. He made of the paper a vigorous propagandist organ of a tone that in these days would be called "die-hard", embarked on controversy with the government and showed himself a vigorous advocate of war, at one time actually contemplating the subjugation of China. Quarrelling with Sir Charles Napier, he wrote in an article welcoming the departure from India of that administrator: "The wisest plan he can now pursue is to retire at once to the privacy of private life and allow time for his extravagances to be forgotten". If that was a return to something like the earlier manner of Indian journalism it fell short of the pungency of another journal which dismissed the first Lord Lytton with the final fling, "In India Lord Lytton has shown the manners of an Italian organ-grinder with the intelligence of his monkey". Townsend's health broke down after a few years and he returned to England in 1859 to buy and edit the *Spectator*, which had recently been started, and to earn the reputation of the most vigorous leader-writer on the London press. His last contribution to that paper, years after he had relinquished control, was upon "The Unrest in Asia"—a title that brings him curiously close to the present day.

Dr. George Smith edited the *Friend* for the next sixteen years and during the whole of that time was the Indian correspondent of the *Times*. A man of deep culture, an educationist of distinction, he was to spend the years of his retirement in such an output of books upon Indian life as dizzies and appals when regarded as the work of one elderly man.

Leaving Bombay, Robert Knight had come to Calcutta to found the *Statesman*, and quickly to acquire the *Friend of India*, which was later merged into the *Statesman*. He had established a reputation as a journalist of the highest ability, had been for a short time in government service, and was to prove himself the foremost advocate of the grievances under which he believed India to labour. With his paper

established, he spent some years in England and there published an edition of the *Statesman* in the endeavour to awaken public opinion. He came in contact with the Liberal leaders of the day and was consulted by Gladstone about Indian matters.

In India he faced a European boycott of his paper at the time of the excited controversy over the Ilbert Bill. Of him it may be said that he was a fearless champion of unpopular causes. He won the hearts of Indians, as was abundantly testified at his death. The role of the outspoken publicist is not always compatible with commercial success, and he left to his two sons, Paul and Robert Knight a paper of standing but burdened with debt. From that foundation they built up a great organ of public opinion, and in doing so changed the whole conception upon which journalism in India had been based.

Before the advent of the *Statesman* newspapers in India had been published for the few. Their circulations were limited. The regular price was four annas a copy. They were printed slowly on flat bed machines, though, with characteristic exaggeration, Hyde could speak of the site, "where the *Englishman* press incessantly pulsates". The Knights, father and sons, believed that the time had come to appeal to a wider public. The number of Indians educated in English was large. The European population was growing. The one anna paper had become possible. With the *Statesman* the plunge was made, but if the venture was to be a success rotary printing presses and the linotype machine had to be introduced. The Knights made themselves the pioneers in the change, which was revolutionary in more senses than one. The way was opened to giving India a really popular press. Circulation grew apace. Other papers followed the lead and from purely local organs advanced to the status of national newspapers.

The reform was far more than mechanical. The whole scope of the news was widened. Robert Knight, the elder, had established his own cable service of news from England. In three line paragraphs the events of Europe were covered in half a column a day. That service was acquired and expanded by Reuters. At a later date the Associated Press of India came into existence to gather and distribute the news of India itself. With government aid and that of the Reuter organisation, two men in K. C. Roy and Sir U. Sen, succeeding one another as directors and editors, India was given a far fuller service of news and the costs of newspaper production were reduced. To-day it may truly be said that the Indian papers are at no disadvantage with those of the Commonwealth in the supply of world news, with the wealthier still able to supplement what is common by messages from their own correspondents.

If the Knight Brothers were able to keep ahead amid the new competition that their enterprise had largely fostered it was because they sought from England a succession of able journalists as their lieutenants. Harold Cox, later to be the very independent member of Parliament for Preston, was among the leader-writers and correspondents. S. K. Ratcliffe, still active in British journalism and public life, and George Pilcher, some time member of Parliament, worked on the editorial staff at various times, and J. A. Jones was a distinguished editor for some twenty years. In a later period Arthur Moore and Ian Stephens have been the responsible editors. This is to pass beyond the period of the Knight's proprietorship, for the paper had been acquired by the late Sir David Yule shortly before his death, thus renewing an earlier, if less successful venture in journalism.

By simultaneous publication in Delhi the *Statesman* acknowledged the importance of the new capital, and encouraged there a growth of the periodical press, in English and the vernaculars, that has given all parties their mouthpieces. Most conspicuous upon the newer journals in English are the *Hindustan Times*, edited by Mr. Gandhi's son and voicing the authoritative Congress view of affairs, and *Dawn*, which speaks the mind of the Muslim League. But these have many competitors in a city that promises to become the most active field of the Indian journalism of the future.

The common impression that the British-owned press in India has been something like a consistent supporter of the acts of government is erroneous. On the contrary it has, in general, maintained an attitude of independence and has been constantly critical of the administration. Part of the weakness of British rule has been that at no time could the services explain themselves to the people. Writing of that flowering of Indian journalism that followed upon 1885, Messrs. Moreland and Chatterjee in their *History of India* say, "the papers published for Englishmen in India had from the outset conformed to the English practice of vigorous independent criticism of the actions of Government, and that example had been followed by Indian journalists, so that free and open political discussion had come into the life of India". Of the influence of British journalism upon the political thought of British residents in India, Sir Hubert Carr wrote in "Political India": "A great factor in deciding the present political colour of the community has been the *Statesman*. This newspaper, published at the centre of European non-official influence in India, has maintained a standard of sound political views, which, in spite of the unpopularity of pioneer ideas, won through, and has largely contributed to the liberalism of the British outlook. The *Statesman* has led, rather than conformed to, the opinions of the British community".

It has been frequently said that India's claim for freedom has been nurtured upon the writings of Milton, Burke, Bright and Gladstone, as if these authors were read in every cultured Indian home, which is nonsense. Far truer it is that the British journalists who have gone generation by generation to India, whatever their political faith, have carried with them the traditions of democracy, have discussed questions in the light of British conditions and in the phrases of the great expositors of freedom. They could do no other, and it is from eager reading of the political newspapers and periodicals that most educated Indians have fed their faith. The Indian journalist, very frequently a man educated in England, has gathered from the lips of those with whom he has talked and from daily seeing how life flows in a free country the ideas that he has endeavoured to promote.

That is profoundly true of a great Indian journalist like the late Sir Surendranath Bannerjee, who so long exercised a powerful hold over the thoughts of Bengal through the columns of the *Bengalee*. Probably as much as any other influence that paper, appearing weekly and discussing Indian problems with the measured eloquence of a Gladstone, stimulated the political thought that led to the formation of the Indian Congress. Acquiring it for ten rupees, as he himself records, Bannerjee quickly raised it from its circulation of two hundred copies and made it a veritable Bible of the Hindu political movement. He also made of it a commercial success. When, in his changing political life he abandoned it, the paper passed through several phases, appearing as an evening journal in Calcutta and finally disappearing with the

establishment of the *Star of India*, the first daily paper championing the Muslim cause and printed in English, to appear in the city.

A more ambitious and successful effort at Indian journalism in English has been the *Amrita Bazar Patrika*, a daily paper published in Calcutta and rivalling the British-owned journals in the variety and quality of its news. This has been throughout its existence the property of the Ghosh family, who have provided from their own numbers the majority of the directors in every department of its production. Of the *Patrika* it may be said that in general it has pursued a middle course in politics keeping its feet on the ground. Possibly it was due to that fact that the Congress started its own organ in English, under the title *Forward*. Heavily mulcted in damages for an atrocious libel upon railway servants *Forward* disappeared in a day to be re-born on the morrow as *Advance*, and to presently cease publication as a daily.

One other phase of journalistic activity has to be recorded. In the years of the war papers edited by English journalists were published for the forces and the general public. Produced at the presses of existing newspapers in Calcutta and Bombay these attained circulations vastly greater than had been known in Indian experience. And under the new conditions of Indian Government *Indian Information* interprets fortnightly to its readers the actions of government in a manner that should give the people a closer acquaintance with the acts and motives of the administration than they have had in the past.

Such is the latest gift of British journalism to the development and growth of a responsible press in India. Just as the purely British journalism conquered its early excesses, so Indian journalism in the English language has immeasurably improved its standards. To-day through such bodies as the Empire Press Union, the Indian and Eastern Newspaper Society and the All-India Newspaper Editors Conference, codes of conduct are being established, and Indians and Englishmen are earnestly endeavouring in co-operation to ensure that newspapers, whether in English or the languages of India shall be worthy of a great country. No longer can it be recorded, as in Mr. J. A. Spender's reminiscences, that an English journalist in associating with his Indian colleagues was regarded as "lowering the prestige of the craft". Indians and Englishmen work together as comrades under the same office roof and have long done so.

There could be no more firm assurance that, whatever other changes new political conditions may bring in India, the printing of papers in the English language will survive and flourish. Far from dwindling, the number of such journals is growing, and it may well be that they will fulfil a prediction of the late Sir Basil Blackett that, in time, they will count their circulations in millions. They are indispensable to the interpretation of the new India to the outside world, as Mr. Gandhi himself recognises in the English edition of the *Harijan*. In that future the British journalist may feel that he has made no inconsiderable contribution to the moulding of political and social thought that preceded the creation of two new Dominions.

DISCUSSION

THE CHAIRMAN: You will, I know, all agree that we have listened to the lecture with keen interest and enjoyment. I will now ask Sir John Woodhead to move a vote of thanks.

Sir JOHN WOODHEAD: It is my pleasure and duty to propose a dual vote of thanks, the first to our lecturer, Sir Alfred Watson, and the second to Colonel Astor for presiding at to-day's function. As the Chairman has said, we have all listened to the paper with great interest. I, for one, have enjoyed it immensely because it not only told me many things which I did not know, but recalled to me many things which I had temporarily forgotten. I well remember the day when the Press was not so well represented in India as it is to-day. In the early days of the century, as Sir Alfred said, the *Pioneer* was the paper read by the vast majority of Indians and Europeans in India. At that time I was in Assam which in those days was a rather out of the way sort of place and it often took the *Pioneer* four days to reach us; but we still subscribed to it. It was our paper and we did not begrudge the 4 annas it cost us to get it. In those days the *Statesman* was in nothing like so predominant a position as it is now, and, if I may fill a lacuna in the lecture, I would like to refer to the part Sir Alfred played in bringing that paper to the high position it has now reached in Indian journalism. He was its very successful Editor for the eight years up to 1933, and you will recall that during this time two attempts were made on Sir Alfred's life. But Providence not only extends its protection to administrators but also to editors, and it was with a great feeling of relief that we learned that he had escaped those two attacks. It was miraculous that he lived and survived them.

The number of papers in English, whether under Indian management or European management, has increased enormously during the last two decades and many have reached a very high standard. I should like to emphasise what Sir Alfred said about the *Hindu*—a paper which has reached a high standard indeed in journalism in India and which probably approaches the closest to our ideas of what a newspaper should be.

I remember also when the *Bengalee* was edited by Sir Surendranath Banerjee and was a paper expressing Hindu political views, and it is perhaps interesting to recall its change of fortune in that it ultimately became the *Star of India*, a paper which supported the views of the Muslim League. It is a very great change for a paper which started as expressing Hindu views to have become a paper expressing the views of the Mohammedan community.

I will now ask you to pass my two votes of thanks, the first to the lecturer for his interesting paper and the second to the Chairman for so graciously presiding over our meeting this afternoon.

The votes of thanks were carried with acclamation.

Sir ALFRED WATSON: I thank you very warmly, and particularly Sir John Woodhead, for the manner in which you have received my paper. No one could be more aware of its inadequacy than myself, but I have had to cover 150 years of English journalism and the story of something like 3,000 papers in 5,000 words. Our Chairman of to-day can tell you that it is taking four volumes, and four large volumes, to tell the history of one English paper. Sir John has alluded to the attempts on my life but he did not make it clear whether he regarded these as a mark of success or failure in my capacity as publicist. I am glad to have survived to thank you this afternoon for the manner in which you have received my paper.

After the Chairman had also thanked Sir John Woodhead for his words, the meeting then terminated.

OBITUARY

Engineer Rear-Admiral SYDNEY RUPERT DIGHT, C.B.E.—We regret to announce the death in London, at the age of 62, of Rear-Admiral Dight who had been a Fellow of the Society since 1945.

Rear-Admiral Dight joined the navy in 1905. During the 1914-18 war he served as Assistant Secretary of the Board of Invention and Research and then in 1928 he was put in charge at the Admiralty Fuel Experimental Station at Haslar. During the recent war he served at the Admiralty in the Local Defence Division and with the Petroleum Warfare Department, being responsible largely for the development of smoke protection of industrial targets from aerial bombardment.

GENERAL NOTE

ART IN PARIS TO-DAY.—For a good many years past I have written from time to time in the *Journal* on aspects of Art—more especially English art—and a visit to Paris a month or two ago has prompted me to give a brief survey of the French art I saw in the little galleries on both banks of the river. For years we were cut off from our closest neighbour and the import restrictions on works of art and the few Continental art publications that have crossed the Channel have left us still very much in the dark about contemporary tendencies in the art capital of the world. It is true that we had an opportunity a year ago of seeing the recent works of Picasso and Matisse, and it is true also that some well-informed articles have been published in English periodicals; but it is undeniable that public curiosity in the art activities of our neighbour is largely unsatisfied, and a visitor's impressions may therefore be acceptable even if they can do no more than shed another ray on a vast semi-obscure canvas.

The art of various schools flourishes in a number of clearly defined areas in Paris. In the Latin Quarter, for example, and particularly in the tiny galleries in the Rue des Saints Pères, one finds a healthy respect for tradition, and the influence of those great sculptors and draughtsmen of European renown, Maillol and Despiau, is discernible in the work of some young artists to which I shall presently return. On the Right Bank, in the galleries near the Boulevard Haussmann, one finds the flowering of those Parisian movements that have had repercussions all over Europe, as was clearly seen in the great international exhibition of paintings held in the Musée d'Art Moderne.

Paintings designed to meet the requirements of American patrons are on view in the luxurious galleries of the Champs Elysées, and here one comes upon characteristically accomplished portraits by Domergue, views of the Tuileries by Vincenot, harbour scenes by Daniele Degoice and other large and arresting, if facile, canvases.

In the tiny studios (which serve as showrooms) of Wilde and other young artists in the neighbourhood of the Sacré-Cœur, I found some enchanting water-colours of the squares and labyrinths of Montmartre.

To return to the Left Bank and to look in at Le Nouvel Essor, a little gallery in the Rue des Saints Pères, one's eye is arrested by beautifully modelled drawings of female nudes, in carbon pencil and sanguine, by Raymond Martin and P. Belmondo, both Parisian sculptor-draughtsmen. Following the form and characteristics of the model with a nervous line reminiscent of Despiau's, Raymond Martin has produced a masterly series of recumbent and seated figures, and some of his sculptures in the same noble tradition are not unworthy to be placed even among the outdoor classical statuary of Paris. The most impressive of those that I have seen is a vanquished gladiator—*Le Vaincu*—a bronze figure in whose superbly modelled frame every muscle is relaxed, which invites comparison with some of the masterpieces of the Louvre.

A kinship with Maillol is revealed in the refined drawings of Belmondo, both in the characteristic posing of the model with her back to the artist and in the soft tones of the contours. Among other contemporary paintings in this gallery I was glad to find a remarkably fine tawny landscape by de la Boulaye—a painter aged about forty—some little pen and water-colour landscapes by Vergé Sarrat (who held a successful show at the Leicester Galleries some twenty years ago) and a glowing portrait of a young woman by a gifted friend of Segonzac's, Jean-Louis Boussingault, who died a few years ago. The brilliancy of Boussingault's palette is probably only matched in this country by Matthew Smith's; the primary appeal of both artists lies in their pure and glowing colour. The *Femme aux Fleurs*, with its flaming red and orange passages, is a lovely example of the French artist's dazzling pigment.

Derain, Segonzac, Bonnard and Dufresne are among the acknowledged masters who arouse most enthusiasm on the Left Bank. I saw two beautiful Derains—a still-life of yellow fruit, with the outlines of wine glasses delicately traced in white on a black ground,

and a little painting of a boat-building yard, the sombre browns and blues relieved by a note of red in the right foreground. There is no question that this modern master, who first came into prominence forty years ago as a Fauve, is still a potent influence in contemporary French art.

At the Galerie Framond nearby I discovered an interesting large early canvas by Quizet, of a Montmartre slope crowned by the Sacré-Cœur, which might almost have been painted by Utrillo—with whom, in fact, Quizet once shared a studio. Some of the surface qualities of the painting, particularly the white “plastering” of the buildings with a knife, were clearly inspired by Utrillo’s white period. It is not surprising that Utrillo has few followers, for no-one can borrow his distinctive mannerisms without paying him overt homage.

Among the younger artists of promise working in or near the capital mention should be made of Geneviève Charpaon, a young member of the Resistance, who was compelled to work underground during the Occupation, and has now recovered a more luminous palette and a surer sense of values, and Belloc, who is mainly interested at present in façades seen through a row of slender tree-trunks.

On the Right Bank, where I visited a number of galleries in the neighbourhood of the Boulevard Haussmann, I was impressed by some abstract designs by the young Parisian Piaubert, and extremely interested in an exhibition of recent canvases by Chastel, who in the course of his career (he is now fifty) has acquired a notable reputation in France and America. To appreciate him it is necessary to surrender oneself entirely to his restless mood when it is possible to discover, in a critic’s words—“*à travers le sarcasme une protestation désespérée contre la mort.*” Certainly in these grotesque designs, painted in extraordinarily ingenious colour-schemes, the satirical element is strongest; and in a few of his most arresting paintings, in the angularity, mystical fervour, and certain other characteristics of his figures, El Greco appears to be the dominant influence.

N. A. D. W.

NOTES ON BOOKS

DESIGNERS IN BRITAIN. Edited by Peter Ray, F.S.I.A., for the Society of Industrial Artists. Published by Allan Wingate. 45s. nett.

This is the first number of a review which is to be published twice yearly. Its ambitious title, *Designers in Britain*, is amply justified. It gives in two hundred and fifty-four pages, most of which are occupied by illustrations, a heartening survey of the talent which is available, here and now, in Britain. It demonstrates the quality of mind and variously diversified accomplishments of the designers who are ready and able to address a multiplicity of gifts to problems of commercial and industrial design.

As a book, it is wisely and clearly planned. There are two main sections, concerned respectively with Commercial Design and Industrial Design. Here, assembled with the skill and typographical lucidity one expects from Mr. Peter Ray, are emphatic and satisfying refutations to all those people, in and out of industry, who think and say that for good industrial design, for style, imagination and modishness you must go either to Europe or the United States. Here are the proofs that we have the men who have the gifts and, occasionally, have the opportunities their lively, trained imaginations deserve.

The section on commercial design occupies one hundred and seventy-seven pages, contains some seven hundred and forty-seven illustrations, and has an introduction by that great impresario of talent in commercial design, Mr. Jack Beddington, C.B.E. This section includes posters, trade-marks and symbols, packaging, press advertising, illustrations and cartoons, booklets, folders and leaflets, and that exceedingly important branch of temporary architecture, namely exhibition stand design and display. Attention

is also given to type faces, magazine design, book jackets and book design, and the section concludes with a miscellany, which packs into three pages such varied examples of work as postage stamps, Christmas cards, telegraph forms and menu cards. By its nature, this first section is concerned almost wholly with design in relation to distribution; the only products included in it are books.

The second section, which deals with industrial design, is disappointingly small, consisting only of sixty-four pages and some two hundred and seventy-two illustrations. Sir Thomas Barlow, G.B.E., Chairman of the Council of Industrial Design, has written the introduction. The comparative paucity of examples in what should be the most important part of this book is explained by the fact that we, alone of the belligerent nations, turned over the whole of our industry and manpower to war production in the Second World War. This has left its mark upon our contemporary capacity to produce goods; and many of the examples chosen are pre-war. The few illustrations of contemporary work, notably the designs of Mr. Kenneth Holmes and Mr. N. R. G. Poynton for equipment for B.O.A.C., the office furniture by Brian O'Rorke and Frederick Gibberd and the transportable radio receiving set and electric clock by Wells Coates are indications of the immense reserves of ability we have in this country, ready to reconquer the markets of the world when once again the turbulent enterprise of Britain breaks the paper chains which at present restrain the full expression of our national gifts and powers. This second section covers domestic equipment, architectural ironmongery, radio cabinets, lighting fittings, domestic glass, industrial equipment and instruments, prefabricated buildings, vehicles, boots and shoes, ceramics, plate and cutlery, leather, and decorative industrial design in the form of carpets, textiles and wallpapers.

Essentially this volume shows what designers in Britain can do and how many able men and women are now practising as designers.

JOHN GLOAG.

ARRANGEMENTS UP TO EASTER

Meetings for the next fortnight will be found on page 103. Thereafter:—

ORDINARY MEETINGS

WEDNESDAY, FEBRUARY 4TH, at 2.30 p.m.—“EDUCATION FOR MANAGEMENT”. By Lieut.-Colonel L. Urwick, O.B.E., M.C., M.A., Deputy Chairman, British Institute of Management. The Right Hon. R. A. Butler, M.A., M.P., will preside.

WEDNESDAY, FEBRUARY 11TH, at 2.30 p.m.—CRAFTSMANSHIP.—(IV) “CRAFTSMANSHIP AND LEATHER”. By John Waterer, N.R.D., F.S.I.A. John A. Milne, C.B.E., J.P., a Vice-President of the Society, will preside. (Illustrated by lantern slides.)

WEDNESDAY, FEBRUARY 18TH, at 2.30 p.m.—“DESIGN IN SCANDINAVIA”. Travel Reports by four prizewinners in the Society's Industrial Art Bursaries' Competition.

WEDNESDAY, FEBRUARY 25TH, at 2.30 p.m.—“THREE-DIMENSIONAL PHOTOGRAPHY” By C. Butement, Research Manager, Deep Pictures, Ltd.

WEDNESDAY, MARCH 3RD.—To be announced.

WEDNESDAY, MARCH 10TH.—“THE TRADE AND TECHNICAL PRESS”. By Roland E. Dangerfield, Managing Director, The Temple Press, Ltd.

WEDNESDAY, MARCH 17TH.—“RE-AFFORESTATION AS A WORLD PROBLEM”. By H. D. Champion, C.I.E., M.A., Professor of Forestry, Oxford University. (Illustrated by lantern slides.)

INDIA, PAKISTAN AND BURMA SECTION

THURSDAY, FEBRUARY 5TH, at 2.30 p.m.—“THE FORESTS AND FOREST RESOURCES OF BURMA”. By Colonel D. J. Atkinson, O.B.E., I.F.S. Colonel the Right Hon. Sir Reginald Dorman-Smith, G.B.E., former Governor of Burma, will preside.

DOMINIONS AND COLONIES SECTION

TUESDAY, MARCH 16TH, at 2.30 p.m.—“CO-ORDINATION OF RESEARCH IN THE PACIFIC”. By E. Marsden, C.M.G., C.B.E., M.C., D.Sc., F.R.S., Secretary, Department of Scientific and Industrial Research, New Zealand.

CANTOR LECTURES

MONDAY, FEBRUARY 2ND, at 4.30 p.m.—“THE METABOLISM OF FATS” (illustrated by lantern slides.) By A. C. Frazer, M.D., D.Sc., PH.D., M.R.C.P., Professor of Pharmacology, University of Birmingham.

MONDAY, FEBRUARY 9TH, at 4.30 p.m.—“FATS IN THE LIFE OF THE NATION”. By Sir Jack Drummond, D.Sc., F.R.I.C., F.R.S. (Illustrated by lantern slides.)

SOME MEETINGS OF OTHER SOCIETIES
DURING THE ENSUING FORTNIGHT

MONDAY, JANUARY 19..Transport, Institute of, at the Institution of Electrical Engineers, W.C.2. 5.30 p.m. C. Barman and M. G. Bennett, “Living With Transport: a survey of amenity requirements in a public transport service.”

TUESDAY, JANUARY 20..Chemical Engineering Group, at the Geological Society, W.1. 5.30 p.m. Dr. C. H. Desch, “Abrasion, Erosion and Corrosion.” T. A. Dyers and Colourists, Society of, at the St. Enoch Hotel, Glasgow. 7 p.m. T. Haworth, “The Colouring of Rubber.”

Electrical Engineers, Institution of, at Savoy Place, W.C.2. 5.30 p.m. P. P. Eckersley, “To what extent does distortion really matter in the Transmission of Speech and Music.”

Engineers, Society of, at 17 Victoria Street, S.W.1. 6.30 p.m. F. W. M. Ruck, “Meteorology.”

Eugenics Society, at the Royal Society, W.1. 5.30 p.m. H. Harris, “Sex Limitation in Human Genetics.”

Industrial Transport Association, at the Royal Society of Arts, W.C.2. 6.30 p.m. B. Lucy, “Commercial Vehicle Design.”

Refrigeration, Institute of, at the Institution of Mechanical Engineers, S.W.1. 5.30 p.m. S. H. W. Richards and A. Cooper, “Constructional Methods in Insulation.”

WEDNESDAY, JANUARY 21..Dyers and Colourists, Society of, at the King's Head Hotel, Loughborough. 7 p.m. G. C. Grundy, “Non-Textile Uses of Dyestuffs.”

East India Association, at Over-seas House, Park Place, S.W.1. 2.30 p.m. Sir Arthur A. Waugh, “India and Pakistan: The Economic Effects of Partition.”

Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. E. T. Norris, “The Lightning Surge-Strength of Power Transformers.”

At the Merchant Venturers' Technical College, Bristol H. Hurworth, “Some Observations on Oil Deterioration in Transformers and Switchgear.”

Microscopical Society, Royal, B.M.A. House, W.C.1. 5.30 p.m. Dr. R. J. Ludford, “Relation between Cellular Structure and Functional Activity.”

THURSDAY, JANUARY 22..Chemical Society, Burlington House, W.1. 7.30 p.m. (1) D. M. Newitt and K. E. Weale, “Solution and Diffusion of Gases in Polystyrene at High Pressures.” (2) A. I. Vogel and G. H. Jeffery, “Physical Properties and Chemical Constitution.”

At the University College, Nottingham. 6 p.m. Professor Brynmor Jones, “Some Aspects of Aromatic Substitution.”

Dyers and Colourists, Society of, at the Great Northern Victoria Hotel, Bradford. 7.15 p.m. Professor J. B. Speakman, “The Formation of Polymers in Wool.”

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. B. Feldbauer, “The Design of Contractors with regard to their Industrial Application.”

Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 6.30 p.m. “Ideas Exchange and Mart.”

FRIDAY, JANUARY 23..Chemical Society, at the University College, Southampton. 5 p.m. Professor E. C. Dodds, “Synthetic Organic Chemistry in Relation to Biology.”

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. T. A. Crowe, “The Gas Turbine and Marine Propulsion.”

Sound Recording Association, British, at the Royal Society of Arts, W.C.2. 7 p.m. H. J. Leak, “The Significance of the Amplifier in High Fidelity Recording and Reproduction.”

SUNDAY, JANUARY 25..Kinematograph Society, British, at the G.-B. Theatre, Wardour Street, W.1. 11 a.m. B. G. Anstruther, “From Silent to Sound.”

MONDAY, JANUARY 26..Electrical Engineers, Institution of, W.C.2. 5.30 p.m. C. S. Parsons, “The British Patent System and Procedure.”

Electronics, Institution of, at the Royal Society of Arts, W.C.2. 7 p.m. L. E. A. Bourn, “Electronic Organs.”

TUESDAY, JANUARY 27..Architects, Royal Institute of British, W.1. 6 p.m. Sir Frank Stockdale, “Recent Planning Developments in the Colonies.”

Electrical Engineers, Institution of, at Loughborough College. 6.30 p.m. D. E. Lambert and J. Christie, “Standardization of Switchgear.”

Textile Institute, at the Memorial Hall, Macclesfield. 8 p.m. F. H. Howes, “Some Aspects of Textile War Production.”

WEDNESDAY, JANUARY 28..Foundrymen, Institute of British, at the Waldorf Hotel, W.C.2. 7.30 p.m. H. Evans, P. S. Cotton and J. Thexton, “Precision Casting of High Melting Point Alloys containing Nickel.”

Kinematograph Society, British, at the G.-B. Theatre, Wardour Street, W.1. 7.15 p.m. Basil Wright, “The Production of a Documentary Film.”

Microscopical Society, Royal, B.M.A. House, W.C.1. 6 p.m. Dr. C. Seyler, “Microscopy of Coal.”

THURSDAY, JANUARY 29..Photographic Society, Royal, S.W.7. 7 p.m. Dr. D. A. Spencer, “Photographic Visual Aids.”

FRIDAY, JANUARY 30..Electrical Engineers, Institution of, W.C.2. 5.30 p.m. D. C. Gall, Lieut.-Col. W. L. Beck, Professor A. F. C. Pollard and R. d'E. Atkinson “Principles of Instrument Design.”

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. J. M. Davies, H. W. B. Gardiner and W. H. Gomm, “Some Recent Developments in Technique of Radio Valve Manufacture.”

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4761

FRIDAY, JANUARY 30th, 1948

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

MONDAY, FEBRUARY 2ND, at 4.30 p.m. (*Cantor Lecture*).—"THE METABOLISM OF FATS". By A. C. Frazer, M.D., D.Sc., PH.D., M.R.C.P., Professor of Pharmacology, University of Birmingham. (The paper will be illustrated by lantern slides.)

WEDNESDAY, FEBRUARY 4TH, at 2.30 p.m.—"EDUCATION FOR MANAGEMENT". By Lieut.-Colonel L. Urwick, O.B.E., M.C., M.A., F.F.I.A., Deputy Chairman, British Institute of Management. The Right Hon. R. A. Butler, M.A., M.P., in the Chair.

THURSDAY, FEBRUARY 5TH, at 2.30 p.m. (*India, Pakistan and Burma Section*).—"FORESTS AND FORESTRY IN BURMA". By D. J. Atkinson, O.B.E., I.F.S. Colonel the Right Hon. Sir Reginald Dorman-Smith, G.B.E., former Governor of Burma, in the Chair. (The paper will be illustrated by lantern slides.)

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MEETING OF COUNCIL

A meeting of the Council was held on Monday, January 12th, 1947. Present: Sir Atul Chatterjee (in the Chair); Lord Aberconway; Sir Alexander Aikman; Mr. F. H. Andrews; Mr. A. C. Bossom; Major W. H. Cadman; Professor E. C. Dodds; Sir Thomas Dunlop; Mr. E. W. Goodale; Professor C. S. Gibson; Dame Caroline Haslett; Dr. R. W. Holland; Mr. Basil Ionides; Mr. F. A. Mercer; Mr. J. A. Milne; Sir Ernest Pooley; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. Gordon Russell; Sir Frank Smith; Mr. J. G. Wilson; and Mr. William Will; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:—

- Blay, Cecil James, Reading, Berks.
 Bowerman, Brigadier John Francis, C.B.E., Seaford, Sussex.
 Brooks, Mrs. Blanche, Southport, Lancs.
 Brown, Ian James, Toowoomba, Australia.
 Castle, Gordon Reuben, A.R.I.B.A., Hull, Yorks.
 Cooper, Eric Charles, Hounslow, Middlesex.
 Crellin, Richard, Barrow-in-Furness, Lancs.
 Dibden, Henry, M.A., B.Sc., Swindon, Wilts.
 De Lisle, Gordon Frankland, Carlton, Australia.
 Dorman-Smith, Colonel the Right Hon. Sir Reginald Hugh, P.C., G.B.E., Liss, Hampshire.
 Duncan, Miss Mary, Edinburgh.
 Dupré, Ernest Frank, M.D., PH.D., New York, U.S.A.
 Feather, Leslie, Warrington, Lancs.
 Freud, Janos, M.D., M.Sc., Amsterdam, Holland.
 Gallon, William Anthony, B.Sc., London.
 Gardiner, Major James, B.A., Lymm, Cheshire.
 Garside, Bernard Hallows, Gerrards Cross, Bucks.
 Gibb, Sir Claude Dixon, C.B.E., D.Sc., F.R.S., Newcastle-on-Tyne.
 Goldsmith, Norman Carstairs, M.B.E., Bury St. Edmunds, Suffolk.
 Gracie, James Johnstone, Birmingham.
 Hampton, Peter, Shoreham-by-Sea, Sussex.
 Haslam, Hubert Sterland, M.ENG., Rotherham, Yorks.
 Hilliar, Leslie Richard, Worcester Park, Surrey.
 Holland, Lady Helen Ethleen, Tadworth, Surrey.
 Jacob, Lancelot George, M.B., CH.B., Bracknell, Berks.
 Jaques, Professor Louis Barker, M.A., PH.D., Saskatoon, Canada.
 Khadke, Bhalchandra Gandat, London.
 Kirkham, Miss Nellie, Newcastle, Staffs.
 Kirkwood, John, B.Sc., Stafford.
 Lyttelton, The Right Hon. Oliver, D.S.O., M.C., M.P., London.
 McNicol, James Templeton Deans, Glasgow.
 Magurk, John, Wellington, New Zealand.
 Mathers, Alvan Sherlock, B.A.Sc., Toronto, Canada.
 Maxwell, Rear-Admiral (E.) the Hon. Denis Crichton, C.B.E., Bath, Somerset.
 Milner, Walter John Harold, Petersfield, Hants.
 Newton, Stanley Frederic, Bristol.
 Orchard, Jack Stuart, Colchester, Essex.
 Pickles, William, B.COM., Manchester.
 Platt, Christopher James, M.A., West Byfleet, Surrey.
 Plewman, Thomas Langford, B.A., B.COM., Leicester.
 Price, Philip Roger, Lytham St. Annes, Lancs.
 Read, Captain Herbert Sidney, Eastcote, Middlesex.
 Rich, Ralph Murrell, Lusaka, N. Rhodesia.
 Robertson, Professor Alexander, B.Sc., M.A., PH.D., F.R.S., Liverpool.
 Robertson, Lieut.-Colonel John Gordon, London.
 Robertson, Norman Alexander, London.
 Sharman, Reginald, Cheam, Surrey.
 Slater, Joseph Russell, B.Sc., Truro, Cornwall.
 Smith, Samuel Wesley, J.P., B.Sc., Torquay, Devon.
 Stallard, Alfred George, London.
 Stamford, Norman Charles, Chelmsford, Essex.
 Stevens, Stanley, B.Sc., London.
 Tallents, Sir Stephen George, K.C.M.G., C.B., C.B.E., Dartford, Kent.

Thomas, Frederick George, B.Sc., PH.D., Croxley Green, Herts.
Thompson, William, M.Ed., B.Sc., J.P., Sunderland, Co. Durham.
Thornton-Berry, Trevor, M.A., J.P., Leyburn, Yorks.
Watt, William Warnock, Weybridge, Surrey.
Westbrook, Trevor Cresswell Lawrence, C.B.E., London.
Whalley, Philip Guy Rothay, C.B.E., M.A., LL.B., Bovington, Herts.
Wheatley, Wing-Commander Dennis Yeats, Lymington, Hants.
Wood, Geoffrey Vincent, Shipley, Yorks.
Wright, George Maurice, Chelmsford, Essex.
Wright, Norman Charles, M.A., D.Sc., PH.D., London.

The following were duly elected Associates of the Society:—

Chappell, Edwin Brian Horst, London.
Saundery, Dennis Ernest, London.

It was reported that a new sound-and-silent 16 mm. cinematograph projector had been purchased for the lecture hall and an early delivery had been promised.

The Council gratefully accepted from Lieut.-Colonel Cowan the gift of a small bronze bust of the Prince Consort, executed by his grandfather John Cowan.

It was reported that Sir Robert Robinson had accepted an invitation to deliver the Trueman Wood Lecture for the current session.

A quantity of formal and financial business was also transacted.

MR. HENRY MORLEY'S BEQUEST TO THE SOCIETY

Under the will of the late Henry Morley, who died on April 10th, 1927, the Royal Society of Arts and the Merchant Taylors' Company were appointed ultimate residuary legatees of his estate, which was valued at about £30,000.

The Council of the Society desire to record their gratitude for this bequest, the first part of which is shortly to be received by the Society, and they have directed that a notice to this effect should be inserted in the *Journal*.

Henry Morley died at Brixton at the age of 82. He had been a Life Fellow of the Society since 1865, a period of 62 years, and for many years had been a frequent attendant at its meetings. He had been associated with the West African trade for a great many years having joined Messrs. Holland, Jaques & Company about 1874, and shortly afterwards became associated with Mr. Taubman (later to become Sir George Taubman-Goldie), of the Central African Company. This was one of four companies trading in Nigeria which were amalgamated by Mr. Taubman into the United African Company in 1879. Mr. Morley became Secretary of this company, and subsequently of the Royal Niger Company, a post which he held until 1902.

CHANGE OF NAME OF THE INDIA AND BURMA SECTION

At the Council Meeting on January 12th, 1948, it was decided to alter the name of the India and Burma Section to the India, Pakistan and Burma Section. The India Section of the Society, which thus suffers the second change in its name on account of political changes in the East, was established in 1869, and became the India and Burma Section in 1938.

CANTOR LECTURES
MODERN DANISH DESIGN

By STEEN EILER RASMUSSEN, HON. R.D.I.

Delivered on 10th November, 1947

The Royal Society of Arts has conferred upon me the distinction of Honorary Royal Designer for Industry. I feel that my merits as a designer do not justify this honour, but I think that in honouring me you have honoured the work of designers of my own country, Denmark, where industrial design has for many years been successfully carried out in a co-operative way; and I feel, therefore, that it is my simple duty to make an attempt to explain to you how we work.

It is a privilege to do it here in the heart of London in such a noble building, a monument of that England of the eighteenth century whose civilisation has meant so much to us and whom we still consider a mistress of the art of design. It now seems as if we in Denmark learn more from classical English design than do the English themselves. Therefore, when I come here to tell you about our experiments and our experiences I am only repaying an old debt. It *is* old. Already in the eighteenth century English cabinet-making had become the model of design in Denmark. Formerly all aristocrats and other well-to-do people had bought French furniture or French imitations. Danish cabinet-makers wanted a protected tariff against these imports, but the government, instead of agreeing to a tariff of this nature, chose to stimulate Danish design along English lines, so that Danish cabinet-making could compete on an equal footing with the foreign furniture industry. In the second half of the century the government succeeded in establishing a Danish production of such quality and simplicity as could provide a common standard.

In 1777 an institution called "Det danske Mobelmagasin", that is "The Danish Furniture Stores", was founded. It was a state institution with the purpose of advising and educating Danish furniture makers and supporting their work. It supplied them with selected wood, lent them money, and sold their products, when these were approved and had received the hall-mark of the institution. It also furnished the craftsmen with designs to make use of in their work. The designers, who provided this service, were cabinet-makers and architects who had studied in England and who were exponents of that English combination of comfort and dignified simplicity, which educated people on the Continent knew how to appreciate. It may interest you to hear that this eighteenth century attempt to raise the standards of industrial design by government effort was a great success. The work of the "Danish Furniture Stores" can be traced not only in single pieces with the hall-mark of the Institute, but also in the good taste of Danish furniture in general.

As an example of that period, Fig. 1 shows a Danish chair in mahogany. It was made about 1800 and is now in the possession of the Danish Museum of Industrial Art. It is a type that still holds good, light and elegant, unpretentious and pleasant to have in a house with limited space. It is made for ordinary use and for a simple life, but it is nevertheless a refined piece of work. It has none of the classic attribute which adorned French furniture of the period; but it has that indefinable quality which is called style. It is strong with a minimum of material because it is so well constructed; it is gentle and well-behaved. It comes from a good English family

that has always avoided the ostentatious and glossy. The Domingo mahogany is only treated with oil and wax, allowing the daylight to give it the natural deep brownish hue which will never fade but will become more and more intense.

These good English styles in furniture became a Danish tradition and made it easy to start a new movement for simple design a hundred years later. A Danish painter, Vilhelm Hammershøj, who, by the way, is also represented in the Tate Gallery, has shown the charm of old rooms with Danish classical furniture.

After decades of vulgarity in furniture and in architecture, an architect—the late Carl Petersen—in 1912-15 planned a small provincial art gallery in the pure style of about 1800. The furniture for its rooms was specially designed by Carl Petersen in co-operation with a young artist, Kaare Klint, who is to-day the greatest name in

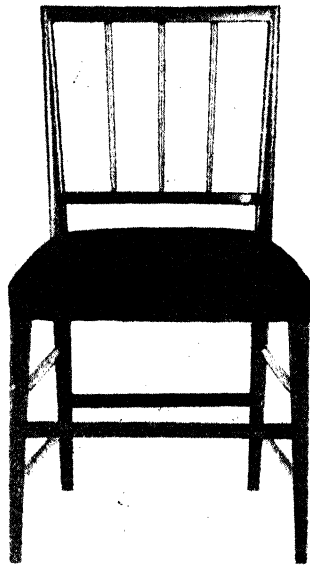


FIG. 1.—*Danish chair in mahogany, c. 1800*

architecture and design in Denmark. At that time, however, he might just as easily have become a great painter or sculptor. Under the influence of Carl Petersen he designed the light and elegant chair, shown in Fig. 2, which possesses all the qualities of good old Danish furniture without being an exact copy of any existing model. It is the spirit of the old masters he has revived.

After his work at this museum Klint continued to design furniture, which, during his first period, was influenced not only by Danish tradition, but also often by Chinese style which already in the eighteenth century had given such important impulses to European design. The sofa shown in Fig. 2 gives an example of the Chinese influence in Klint's design. In 1924 a professorship in furniture design was established at the architectural school of the Academy of Fine Arts, and Klint was appointed to it. From the very beginning he maintained that the training should be open not only to architectural students, but also to any gifted young craftsman.

Under his guidance his students worked together in small teams. Although Klint is a man of great artistic talent he works on a completely rational basis. The technique of production and the ultimate use of the finished article are, for him, the foundations of all good design.

The first thing his students do is to make a very exact measured drawing to full scale of an example of furniture which is worth studying for its material, its craftsmanship, its adaptability and its appearance. These drawings are as exact as scientific studies and every detail is discussed. For this preliminary study it is obviously a great advantage to have working together people from the crafts and others trained as draughtsmen. The purpose is not to copy the good old stuff. The man who has

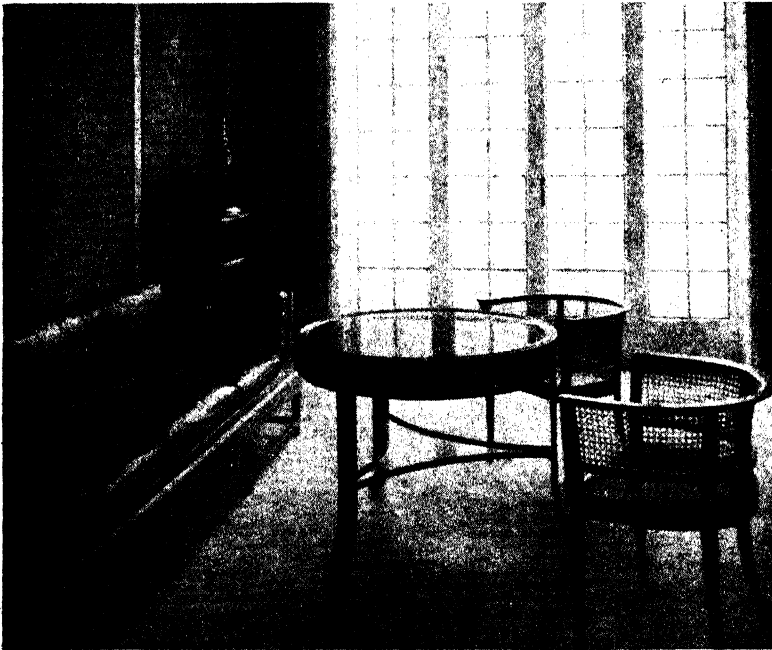


FIG. 2.—Furniture, designed by Kaare Klint, at the Museum in Faaborg

studied good furniture of bygone days and appreciates it from a professional point of view, will also understand that it is good because it has solved the problems of its period. New furniture must, in the same way, solve the problems of our age.

In furniture as in architecture the question of economy is of the greatest importance, not only economy of money, but also economy of labour and economy of space. Good furniture is made to fit man, which means that the scale is bound to human measurements. The different sizes or divisions of furniture dictated by human dimensions are studied: for example, heights which can be reached, normal seating, and so on. Other dimensions of furniture are also restricted. For example, the writing table should not be larger than the writer can reach across; and the dining table is divided into "couverts". Similarly all furniture made to hold utensils must be dimensioned to suit them. In the old times good furniture was often made for homes with an abundance of space and with plenty of domestics. To-day it is

considered a virtue to create furniture which fits into much smaller dimensions and gives less labour.

Already in 1924 Klint and his school had started to investigate dimensions of things that are usually kept in cupboards in ordinary homes. They went to shops and stores and worked out standards for all sorts of things. They measured forks and spoons, plates and dishes, glasses and carafes, cups and saucers. All these dimensions were harmonised, and together they gave a harmonious form to the drawers of a cupboard. It is surprising to see how much a relatively small cupboard can hold when it is properly planned. Fig. 3 shows such a cupboard when it is closed. Both the Chinese and the English influence can be seen in this very simple piece of furniture. In the same scientific way a wardrobe is studied and planned. Klint has come to the conclusion that when you measure in English inches everything is simple, but when you calculate in metres and centimetres it all becomes very complicated and awkward. One metre is one ten-millionth of the distance from the North Pole to the Equator, a measurement which is of no importance in connection with furniture. Feet and inches form a human scale. Klint's school is not only an institute for



FIG. 3.—*Cupboard, designed by Kaare Klint*

training designers, it is a laboratory where the results are kept registered and made available for young students.

Articles of furniture are tools and should be regarded as such. It is not important to create new patterns, but it is essential to create better tools. This can only be done by work as zealous as a scientist's. The first thing to do is to collect existing examples; the next is to investigate them; the third to analyse and criticise them, and then, only at this moment, can the attempt to improve on them start. The problem of a chair is not like that of a poem—the expression of the very soul of its originator. The more neutral and anonymous the designer is, the more likely he is to create a true chair rather than a mere fantasy of one. The function of a chair is the same now as it was hundreds of years ago. A good Chippendale chair holds the right measurements in height, depth and width. It supports the back of the sitter exactly where support is wanted. The construction of the lower part of the chair is ideal and can hardly be improved upon. The back which can be seen above the top of the table is higher and more elaborate than is natural for a modern chair, but the lower part is as simple, and, at the same time, as comfortable as you can wish. Klint and his students made a point of creating a new chair, which had the virtues

of the old, combined with the simplicity and comfort of the present. Fig. 4 demonstrates the results of their efforts in three variations. On the whole, English furniture of the eighteenth century is so admirably good that it forms a natural basis for the designer of new furniture.

About twenty years ago the great Swedish architect, Gunnar Asplund, on a visit to Copenhagen asked what Klint was working at. "I am trying to design a chair", was the answer. When Asplund came to Copenhagen the following year he again asked what Klint was doing and he got the same reply. In the meantime Asplund had finished a huge library for which he had designed many chairs, and he had started some new work in a completely different style. But when Klint had finished his chair he did not change his style. It was a very simple creation but it has lasted. It is still good and is still being sold by the thousand. His school also experimented with combinations of dining tables—tables that could be made longer and shorter or added to each other, all harmonising in simple measures—until in the end he seems to have exhausted this problem as well.

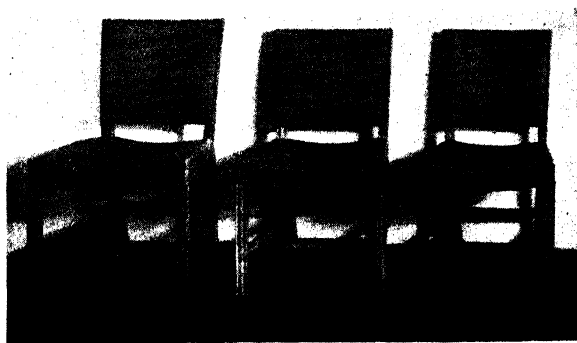


FIG. 4.—*Mahogany chair in three variations, designed by Kaare Klint*

It is often said that Klint is not original and that he only copies good old furniture. This is not true. He is not interested in making things look old. He is only interested in quality. He can just as well work on a quite modern thing as, for example, a deck-chair for a liner. And when he goes in for such a task it is not in order to make something that reminds you of a well-known type. No, it is the type itself which he tries to improve, and he will not leave it before he has studied all its problems and completed it in a more perfect form than that in which he found it. Klint's father had designed a great church. After his death Kaare Klint had to complete this work and also to design furniture for it. According to Danish traditions congregations must sit in the most uncomfortable of pews. Klint did not want to follow this tradition and so he went to France and England to study church chairs. He found there rush-bottomed chairs, the simplicity of which he considered suitable for his church, and accordingly he designed his new chair on those lines (Fig. 5). This rush-bottomed chair could be adapted for mass production made in bentwood, and a Danish factory made thousands of them at a cheap price. They are extremely handsome in a lofty nave, but are useful anywhere and have had a great sale beyond their original purpose.

Old furniture often becomes finer with use, while many new things become shabby after some years. It depends on how the material has been treated from the beginning, how surfaces and how edges are formed. If they are sharp and fierce they will soon be broken and ruined; but if they are sympathetic and gentle they will wear for ever. Klint has, for the most part, designed furniture which is rather dear. It is mainly connoisseurs who own his products; but his work has not only resulted in some few excellent pieces, his studio and his school are laboratories of importance for all furniture-makers in Denmark, and his principles have proved to be fundamental for a standardised cheap production.

In Denmark the co-operative societies form the greatest selling organisation in the country. They provide people with all sorts of domestic utensils and also with furniture. For several years I have been adviser to them for the purchase of well designed objects. It was always difficult to get good furniture at a cheap price. We found that the best method was to start a designing office of our own. A young designer, Mr. Mogensen, who had had the best training available in Denmark,

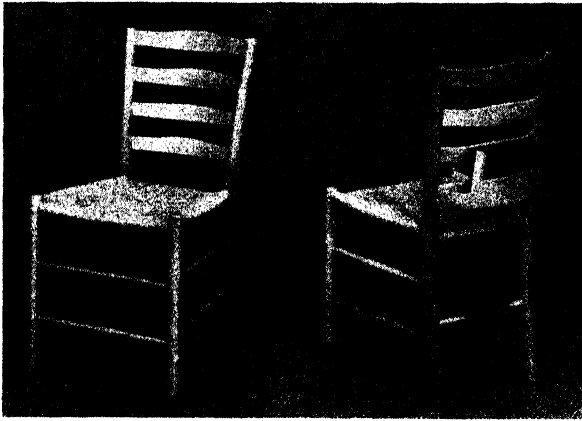


FIG. 5.—*Rush-bottomed chair, designed by Kaare Klint*

being a student of Klint, became the head of the office. After two years of work he could present a range of designs that covered the greater part of the demand. The results of his work give an object lesson in Klint's theory. All the measurements are made *useful*; there are cupboards big and small, which can be divided into separate units and which can be put together in many different ways. The customer can start with a single unit and then add to it, building one on top of the other. You can have your units with or without legs, but they all have exactly the right height and scale. On top of a cupboard can be put a bookshelf which opens out as a writing desk.

The small home must also have its easy chair, which should afford comfort without taking up too much space, and should be designed to fit human forms. Fig. 6 shows a group of furniture designed for the co-operative societies—cheap furniture for an average small home. This furniture is mainly sold from a shop in Copenhagen and the demand is, unfortunately, much greater than the output. The society has its own factory now but it is very difficult to get both material and labour. Then

there are several other problems connected with furniture design; for example, two young designers, disciples of Klint, have gone in for furniture which is easy to pack and despatch. Just as Klint studied the most rational way to put utensils into a cupboard, they have studied how best to pack furniture in a goods train.

I have mentioned the importance of furniture's being sympathetic and gentle. The task of the designer is not only to make the working drawings but to follow the work—to feel with his own hands the material out of which his design is produced.



FIG. 6.—Group of furniture, designed by Børge Mogensen

The word "design" covers a large field. I have dealt with furniture at length; I considered it better to go into the details of one branch of design rather than to tell you only a very little about many things. However, before I stop I should like to mention silver and cutlery, because here also we are in great debt to England and to British civilisation. Examples of plain silver which were exhibited in Copenhagen in 1932 have had great influence on our modern designs of silverware. We found an English silver pot from about 1800 much more modern than our own very elaborate and ornate George Jensen silver. After study, similar to that of Klint

and his students with the eighteenth century furniture, real works in silver, modest but still very refined, were evolved (Fig. 7).

Lastly, I will mention the new designs being evolved for cutlery. Here again the method is exactly the same as Klint's. For many months all the knives which could be found were collected and tested. Their uses, faults and qualities were found, they were criticised, and then improved designs were evolved. It took a long time but the results achieved are very promising.

We have learned in Denmark that competitions can be a good means of improving design. Our cabinet-makers every summer invite architects and other designers to send in proposals for new types of furniture. The best of these are

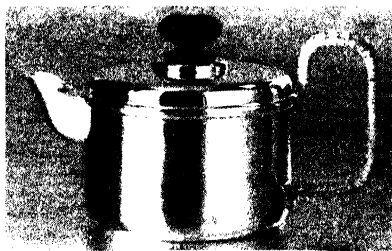


FIG. 7.—*Teapot in silver designed by Kay Bojesen*

shown in an exhibition each autumn. In this way young talent gets a fair chance to shew what it can do and the popularity of the exhibition shows that the public follow the work with a keen interest. We have also had competitions for new designs for cane furniture, wallpaper and fabrics, and, in this way, young designers and producers have found each other.

I began by saying that I came here to repay an old debt to English design. I hope I have succeeded in expounding my thesis to you. In the world of design there ought to be no national boundaries. Therefore, if my exposition can help to re-open the channels of exchange which were closed by the War, I feel I have given my modest contribution to an important function of a democratic civilisation.

ADVERTISING AND COMMERCIAL DESIGN

By ASHLEY HAVINDEN, R.D.I., F.S.I.A.

Delivered on 17th November, 1947

Advertising poses design problems of a special kind. These arise out of a combination of the requirements of the advertiser, the media to be used (whether on the hoardings or the press) and the psychological reactions of the observer. To solve these problems successfully requires a different approach to graphic expression than is necessary in other fields of printing and publishing in which similar combinations of pictures and words are used.

Advertising is concerned with communication under the most exacting

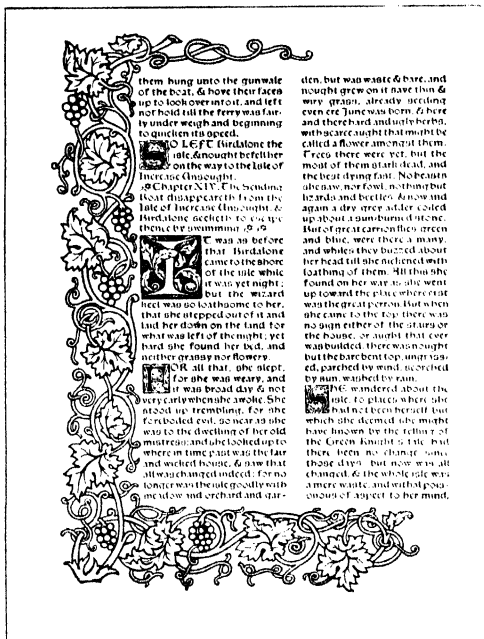
conditions. Nobody consciously wants to look at advertisements; no one buys newspapers in order to read advertisements, or walks down the street in order to look at posters. Yet so great has been the development of advertising, that advertisements have become a normal part of our field of vision. We accept them as part of the furnishing of newspapers and magazines, and streets, and we tend to notice them as little as we do the familiar objects of our households. So that if people are to be made to look at advertisements, the designer of them has to be a specialist in what might be called the "Art of Interruption". Not only must our vision be interrupted, but our attention must be arrested. The subject matter of the advertisement must leap into our minds with the minimum of friction and the maximum of interest.



(a)



(c)



(b)

FIG. 1 (a) Poster of 1885

(b) Page from the Kelmscott Press edition of "The Water of the Wondrous Isles", 1897

(c) A half-page of typical advertisements in a journal of 1906

Since by its very nature advertising is by way of being an uninvited guest, it would seem necessary for its appearance to be as inviting as possible, which makes it difficult to understand the generally unattractive garb it has woven for itself over the years. Unless the appearance of advertising commands respect, how can it fulfil its avowed purpose of inspiring respect for the excellence of the goods and services recommended?

However, in spite of its defects in visual appearance, advertising is firmly established as a necessary part of the distribution mechanism of modern industry. We have to accept the legacy of its general appearance, but let us not do so with

complacency. By attempting a study of the various factors which have influenced commercial design in advertising, and which are influencing it to-day, we ought to arrive at some conclusions which point the way to future developments.

It was towards the end of the 19th century that advertising really started to become the handmaiden of mass production. If goods are made in millions with great speed, they must be disposed of with equal speed, in order to keep the wheels of Industry turning. How did advertising begin to tackle this task? Let us look at a poster of 1885 (Fig. 1 (a)). This is what might be called "a typical commercial job"! It illustrates the typographical standards of the time. Obviously no great designing skill was considered necessary to attract attention. There is very little "art of interruption" being practised here! This period was the hey-day of Victorian expansion, and taste was at a low ebb. It was all too easy. The world wanted manufactured goods, and the Victorians had them. Artists and designers were considered superfluous; the manufacturer was his own designer.

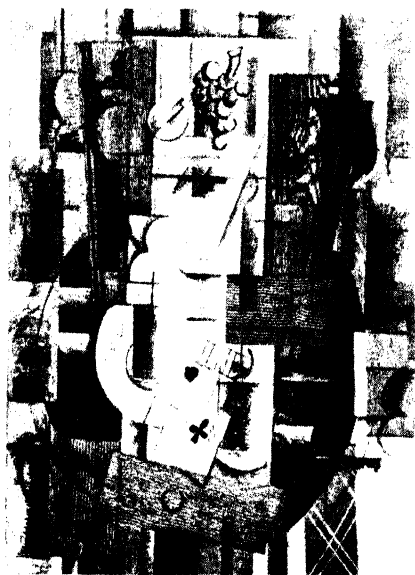
However, fortunately revolt was brewing against the general bad taste of the times, not only in books and printing, but also in painting, architecture, interior decoration, and the applied arts. William Morris was one of the first to attack what he considered the anachronisms of the machine age. He sought to return to the good traditions of handcraftsmanship (Fig. 1 (b)). True, his influence was not very important as far as advertising was concerned, apart from his general restlessness towards complacency.* It was not until well into this century that his researches into the field of type design were followed up, and developed by Stanley Morison and Francis Meynell, who were chiefly responsible for the typographical renaissance after the 1914-18 war. William Morris, unfortunately, in going back to medieval times for his printing models went back a bit too far, or, in a sense, not far enough! When he set up the Kelmscott Press in 1891, he evolved a type design reminiscent of the Gothic characters of a 12th century scribe, whereas, if he had studied the 15th century printing types of Nicolas Jenson and Aldus Manutius, he would have had a much better model for his Roman letter. On the other hand, if he had gone back much earlier still, to the 8th century scribes, he would have known the Caroline Miniscule of Tours, and thus have started level with Jenson and Manutius in following the same inspiration. However, it is true to say that Morris started the ball rolling. Other private presses set up—all pre-occupied with recapturing the taste and scholarship of earlier periods of good book printing.

If the influence of Morris was one of "looking-back" as far as printing and typography were concerned, in poster design a new "forward-looking" influence was beginning to show itself from the field of painting. The revolt against the sentimental realism of most academic painting having received its first impetus in the sixties from Impressionism, culminated towards the end of the century with the Post-Impressionist painters. It was the influence of these painters, particularly Cezanne, Gauguin, and Van Gogh, which could be directly traced in the posters of Toulouse-Lautrec in France, and which found a short-lived echo in this country in the posters of the Beggarstaff Brothers. It was not, however, until well

* This can be seen from the typical example of a half-page group in a *Journal* of 1906 (Fig. 1 (c)).

after the turn of the century, that the real influence of the Post-Impressionists was to show itself in advertising. This was a direct result of the development of Post-Impressionist painting into the Cubist movement, just before the first world war. The paintings for example of Picasso and Braque (Fig. 2 (a)), were to have a profound effect on the poster; and once the war was over, Cubism, together with the social upheaval caused by the war, brought about a completely new attitude, not only towards the poster, but towards the decorative arts generally.

Since one of the most difficult tasks of the poster designer is to find dramatic visual forms for expressing the subject matter of the poster, the emphatic semi-geometrical shapes in Cubist painting provided the required means. In this country Nevinson's poster for his exhibition in 1919 of his war paintings is the



(a)



(b)

FIG. 2 (a) Cubist Painting by Braque "Still Life with playing cards", 1913

(b) London Underground Poster designed by E. McKnight Kauffer, Hon.R.D.I., 1922

earliest example. However it was left to McKnight Kauffer to develop the new possibilities to the full. Among the first of a long series of posters for the Underground, the London Museum poster, depicting the Great Fire of London, produced in 1922 (Fig. 2 (b)) shows most clearly the influence of Cubism. By a process of analysis and synthesis Kauffer breaks down the amorphous flame shapes into simple, almost geometric formulæ, and then combines them together to build up an emphatic visual impression of the flickering complexity of smoke and flame. Kauffer's use of vivid colour and geometric composition has had a far-reaching effect on all poster designers in this country, although his work at the time of its first appearance, led, like Cubism itself, to great controversy. Kauffer's posters were like a fresh breeze blowing through the stale commercial atmosphere of the

time, and undoubtedly did more to raise the status of poster design than any other single influence. Far too many posters were (and still are) a combination of crudely executed realistic pictures and badly designed lettering, associated together, not by design, but because they happen to be on the same piece of paper!

Parallel with the influence of Cubism on posters in this country in the early 20's, an entirely different development was taking place in press advertising, resulting from the influence of fine book printing. Following William Morris and the private presses, Stanley Morison and Francis Meynell realised that, if good type design was to be reinstated, it was not a matter of handcraftsmanship; for any lasting benefit to accrue, the machine must help. Accordingly, through Morison's association with the Monotype Corporation (or Lanston Monotype as it was then) and as a result of his typographical researches, some of the most beautiful types in the world were recut as matrices for use on Monotype machines. I refer particularly to the revival in 1923-24 of the 16th century Garamond and Plantin letters, and the 18th century Caslon and Baskerville. Since that time practically every great type design has been made available by Monotype, including many contemporary types—notably the famous Gill Sans series and Times Roman.

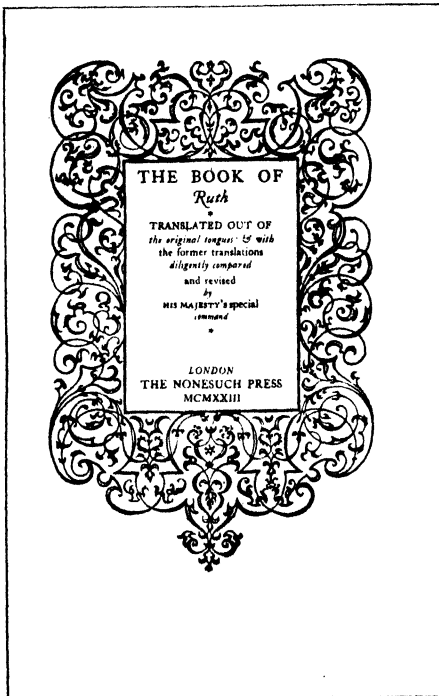
In 1923 Francis Meynell started the Nonesuch Press with the object of designing and publishing books of the standard of privately printed de luxe editions, but at a price only a few shillings more than a popular novel; few Nonesuch books cost more than a guinea. This could only be done by machine production. Thus by a nice marriage of circumstances the Nonesuch Press was able to use the Monotype Revivals. Fig. 3 (a) illustrates a beautiful example of a Nonesuch Title page printed by the Pelican Press in 1923, using Monotype Caslon and an arabesque border after the French 16th century originals of Geoffroy Tory and Bernard Salomon.

The significance of this revival of traditional typography for books was not only deeply felt in the book trade to our everlasting pleasure when we buy a book from a good publisher to-day, but it had an immediate effect on press advertising design. This was particularly noticeable in the work of Charles W. Hobson, who produced in 1924 advertisements of a high typographical excellence (Fig. 3 (b)). Commerce for the first time began to wear the mantle of culture. With Stanley Morison as his typographical adviser, Hobson established the symmetrical lay-out as the norm for distinguished advertisement design. His advertisements imposed something of the classical grace of Georgian taste on a vulgar machine age. The technical means of doing this were provided by the excellent Monotype revivals in the type repertoire of the Cloister Press, which Hobson founded in Manchester with Morison's help.

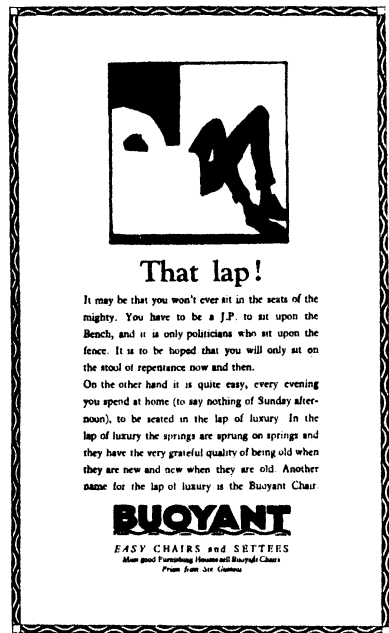
Hobson's advertisements had a great influence on the commercial designers of the time. They focussed the limelight on the value of careful attention to typographical detail. They also stimulated designers' interest in the importance of good type design in improving the appearance of the display as well as the legibility of the body text of advertisements. The resultant demand for special types, and careful setting, was responsible for the growing use of advertisement type-setting firms. The Pelican Press in London, of which Francis Meynell was a founder, was one of the forerunners in supplying this demand, since it was already equipped

with a great variety of excellent type-faces. The advantage of the typesetter was that it became possible to make a masterplate of the setting of the advertisement, from which copies could be taken for sending to the newspapers. This was a great improvement on the old method of getting the advertisements set in the limited range of types (most of them of bad design) which were carried by the newspapers or periodicals in which the advertisement was to appear.

Looking back critically on those formative days we can now see that the derivative approach to the symmetrical layout had its limitations. The designer's desire to frame the announcement in the manner of a picture meant the unifying of the text and illustration as a whole and the placing of it in the centre of the space.



(a)



(b)

FIG. 3 (a) Title page from the Nonesuch Press edition of "The Book of Ruth", 1923
(b) Press Advertisement by C. H. Hobson Ltd., 1924

Also in striving after a pleasing appearance, the illustration tended to be treated in a decorative manner, to sort well with the traditional type-face and the specially designed nameplate and decorative border. Thus, for the sake of typographical purity a woodcut effect was preferable to a half-tone illustration. In general the appearance of such advertisements might be said to be the result of a preconceived solution to the layout problem. It required the grooming of the matter in order to make it appropriate to this traditional method of expression. Thus, although Meissenbach perfected the half-tone block as far back as 1882, in order to make the reproduction of photographs possible, even in the middle 1920's such a method

of illustration seemed an anachronism in a classically symmetrical layout using traditional type faces.

Just as it was increasingly difficult for the eye to ignore the aeroplane in the sky, or the motorbus which had displaced the horse bus on the streets, equally it was difficult to ignore the impact of the candid camera, the moving picture, and the greater frankness of expression, both in journalism and conversation, which shaped so deeply the new post-war environment. Could the designer's tendency to model the appearance of press advertisements on the typographical forms of earlier centuries be followed as a prototype for advertising 20th century goods and services? In other words, was it not possible to get advertising technique into focus with the immediacy of current needs, by evolving a layout and typographical means which could be integrated with the photograph and the half-tone block?

A solution had to be found because the requirements of advertising were increasingly forcing the use of photographs. In addition the rigidity of the traditional layout not only limited the scale of the parts, but prevented the display of more than one picture or headline with full emphasis, if required. Often the caption and the picture had to appear side by side, as there was no room for them to be centred under each other. Since no organised asymmetric typographical method had yet been evolved, the classical symmetrical approach continued to be used. The designer either pretended the matter was symmetrical when it was not, or he designed all the parts as separate symmetrical units, and then hoped to combine them together into a symmetrical composition. In spite of his attempts to do this, too often the only balance they would make was perforce an awkward asymmetrical one!

However, a way out of this impasse was beginning to show itself on the Continent. In the same way as the Cubist painting of 1913 had affected poster design in the 20's, so a new kind of modern painting was to be the basis of asymmetrical layout and typography.

The destructive work of the Dadaists in debunking academic painting, which followed Cubism, and which was, in turn, followed by the Italian Futurists, seemed to be leading nowhere except as a force for clearing the stage for positive action after the chaos of the war. Therefore, as early as 1921, Mondrian in Holland, El Lissitzky in Russia, Moholy-Nagy in Germany, and others were seeking a new constructive expression in art which would be devoid of sentimental or naturalistic associations. This led them to produce compositions which were exercises in the asymmetric balance of abstract forms in space. The Abstract and Constructivist artists were thus echoing in painting the same principles of design which were being expressed in modern architecture, notably by Frank Lloyd Wright in America, Le Corbusier in France, and Walter Gropius in Germany.

This new constructive spirit was already inspiring a new approach to all forms of applied design through the teachings of the Bauhaus. Professor Gropius had developed the Bauhaus in 1923 from the original Weimar School of Arts and Crafts which he took charge of in 1919. Here was another echo of the William Morris desire to return to handicrafts, in preference to the ugliness of machine goods. Gropius, however, realised that the machine was here for good, and that the only way progress could be made was by teaching students to design for machine production. Gropius had discovered, as an architect, that once the modern building

was erected, there were no appropriate fittings, furniture or domestic articles available to put inside it. In fact all forms of appearance associated with contemporary life were affected by this attitude of mind. The kind of sculpture and painting that explored in its purest forms the basic principles of design would obviously play a part in stimulating experiment in functional design for all purposes. Professor Moholy-Nagy joined the staff of the Bauhaus in 1923. He soon became the centre of experiment in all forms of graphic expression, particularly in photography and typography. Moholy-Nagy, together with the young Austrian artist Herbert Bayer, sought to rationalize printed communication into its most functional forms. Regarding the photograph as more actual than a drawing, they set to work to evolve a typographical method for a similar functional directness. Moholy-Nagy's experiments with the asymmetric balance of forms in space in his paintings provided the clue. The photograph and type matter would be arranged asymmetrically using the white space as part of the composition. This was a great development. Whereas in a symmetrical layout the white space is an amorphous area surrounding the picture and text, in the asymmetric layout the white space is freed to be used in the most effective way. The asymmetric approach allowed much greater scale to the picture; if necessary it could extend right to the edge of the paper. Similarly, as there were greater areas of white space available, a displayed type-line need no longer be arranged horizontally; it could be set at an angle, or even vertically. This new freedom not only allowed the displayed words to be bigger, but their contrasting angle increased the emphasis still more. In addition, sans serif type-faces were used to express in letter forms the same functional directness sought by the use of photography in the illustrations. It was necessary at first, in 1923, to revive the old "grotesque" sans serif types of the mid-19th century. Fortunately, a few years later a full range of excellent sans serif faces became available when German type-founders produced the Erbar, Futura and Cable series. The significant aspect of this form of typography was its complete break with the traditional typographers' love of an "even colour" throughout the layout. The new typography stressed the importance of emphasis through contrast—contrast of scale, contrast of colour, contrast of type sizes and weights.

The Bauhaus was not alone in trying to express in typography and layout the same constructive attitude which was typical of the new functionalism in architecture and the applied arts. There was the painter and architect, El Lissitzky in Russia, Piet Zwart in Holland, and the famous Swiss typographer, Jan Tschichold working in Germany.

All this activity, of course, had a marked effect on advertising, particularly in Germany, Holland, Switzerland and France, and to a lesser extent in England. The German magazine on international advertising art, "Gebrauchsgraphic", first published in 1923, played an important part in keeping commercial designers in this country informed on continental work. Many experiments were made in England to exploit the "dynamic" asymmetric lay-out. With the headlines displayed in curves, and often the body text itself set at an angle, the advertisements "stood out" in the newspapers in contrast to the horizontal setting of the editorial columns. This was an advantage when we remember the old problem of attracting the eye of the public. Nevertheless, at this time (1926) the apparent freedom to place the

elements in unusual positions was exploited more to attract attention than as any conscious system of setting out the material in the most functional way. To illustrate this difference I have chosen two examples from 1926 for comparison (Fig.4 (a) and (b).) A poster designed by Herbert Bayer which might be regarded as a model of Bauhaus functionalism (a); and a press advertisement for Chrysler cars produced by W. S. Crawford Ltd. for which I did the lay-out (b). Looking back to these days, I remember that it was not until 1929 or 1930 that I had the pleasure of studying and learning from Jan Tschichold's book, "Die Neue Typographie". This book, published in 1928, was the first clear exposition of the principles of the new typography as a logical approach to the layout problem.

While these new influences from the Continent were changing the appearance of press advertising, a parallel functionalism was being developed in poster technique, particularly by Kauffer in England, and Carlu and Cassandre in France during the 1930's. The constructive simplicity of Abstract painting was replacing the

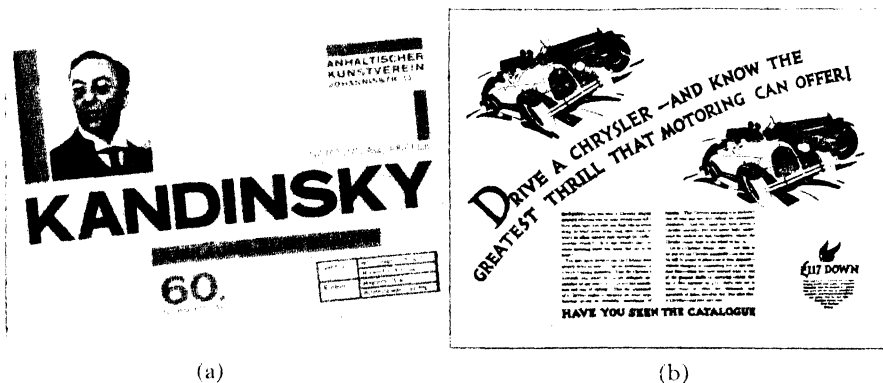


FIG. 4 (a) *Exhibition Poster designed by Hubert Bayer, printed in Bauhaus printing shop, Germany, 1926*

(b) *Press advertisement by W. S. Crawford Ltd., 1926*

earlier influence of Cubism. These artists were exploring the new dynamism arising from sharp contrasts of scale, as well as the use of the realism of photographs. The ideas behind the posters were being treated less decoratively; simple, asymmetric composition was used to express the subject matter more quickly and forcefully.

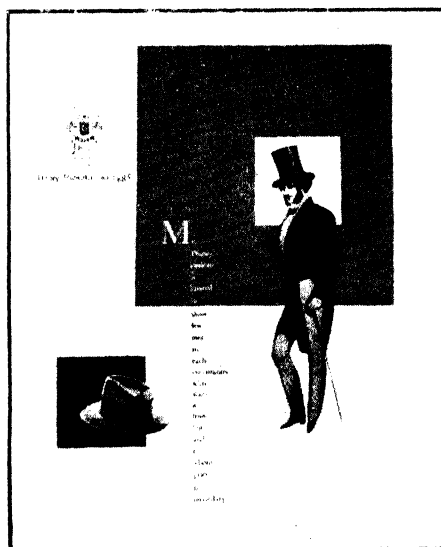
Throughout the 30's a new graphic language of visual communication was maturing in the design of press advertisements. Since the value of abstract construction was now accepted as the vital framework co-ordinating the elements in space, the design of the elements in themselves now came under review. In addition to the sans serifs and the many German "modern" display faces, also produced during the late 20's and early 30's, such as Narcissus, Maximilian, Neuland and Locarno, a new interest was developing in the display possibilities of many 18th and 19th century types which were becoming available in re-cut or re-designed versions. These included fat faces, copperplates, and Egyptians of all sorts. Also pictorially the advent of Surrealism, with its dream juxtapositions of images regardless of

normal associations in life, suggested new possibilities in illustration. Particularly the collages of Max Ernst, made up from 19th century engravings, were significant in this connection, since they expressed another aspect of the same interest in reviving 19th century display material.

By the end of the 30's, with this full repertoire to dip into (including, of course, the whole range of classical Monotype faces), the designer was able to select the type which he considered most suitable for the work; not because it was modern, or because it was traditional, but because, in his view, it gave the right "nuance" to the expression of the words. If necessary he could mix type faces from different periods for purposes of emphasis. (Jan Tschichold had already given a lead in the asymmetric mixing of type faces, which he expounded in an article in



(a)



(b)

FIG. 5 (a) Press advertisement designed by Hans Schleger, F.S.I.A., for Shell-Mex & B.P. Ltd., 1938

(b) Magazine advertisement in tan and black designed by Paul Rand, U.S.A., 1946

"Typography" No. 3, 1937). The designer also could approach the pictorial part of the work in the same way. He could use a photograph, a bold diagrammatic drawing, an old woodcut, or a 19th century engraving. If necessary he could use all of them in the same composition. The important development in this approach to commercial design was the designer's freedom from prejudice, and his ability to cull his material from any source, without feeling in any way bound to express it in the manner originally appropriate to its form. That is to say he was not interested in pastiche, but in composing his material in a way that would suggest to the observer the utmost contemporary significance. Since it is impossible to show all the slides I used in my lecture I must content myself with only one illustration from a press advertisement designed by Zero (Hans Schleger) in 1938 for Shell (Fig. 5 (a)). With great imagination and ingenuity, Zero has used Surrealism as his

point of departure to express the complexities of chemical reaction in a dramatic pictorial way. The layout is symmetrically composed out of asymmetric parts; the display types are a mixture from the late 18th and early 19th centuries; the text type is a 16th century derivative; the pictures are late 19th century engravings. Yet the originality of the total effect conveys the impression that Shell products are by no means old-fashioned, but very much up-to-date!

Although with the outbreak of war the emphasis shifted away from pre-occupation with advertising commercial products, the need for effective design for National purposes was vital. The limitation of newspaper space early in the war naturally restricted advertisement design, but in the poster field the Government realised that shouting injunctions from the hoardings in conventional designs would not have the vigour and urgency required to attract attention. The authorities must be commended for the progressive policy they followed. The result was that the majority of official posters were modern vivid designs, which made their points clearly; they were a striking example of the war-winning value of enlisting the aid of good contemporary designers.

Unfortunately the war and the continuing paper shortage have arrested the development of press advertising design, which was maturing in such an interesting way just before the war. However, these tendencies are being worked out in America by a number of leading commercial designers. I have only room to show a single example, so I've chosen one of Paul Rand's magazine advertisements from the series he has designed for Disney Hats in 1946 (Fig. 5 (b)). In comparison with Hans Schleger's design for the Shell advertisement, this example shows an entirely different use of the same sort of graphic material. Here 19th century ingredients are chosen to impart authority of long-establishment, but if the designer had expressed them in a pastiche form of the period the advertisement would merely have looked out-of-date. Rand has done the opposite, he has presented them forcefully and with originality in an energetic "abstract" composition. The appearance of the advertisement is calculated to give the observer a "dynamic" 20th century conviction that the firm of Disney is still leading to-day because of, and not in spite of, long past experience in hat making. The display type is 18th century, the figure and the trade mark are late 19th century engravings, but the hat is given actuality by being a 1946 photograph; and the layout is a modern abstract composition, exploiting the masculine emphasis of the square. Ingeniously, the white square framing the hard 19th century hat is echoed by a black square of identical size accenting the curvilinear comfort of the modern soft hat.

So far in this summary I have tried to show how various factors have influenced and enriched the technique of commercial design. I should now like to stress two of these—Abstract Art and Surrealism—as being specially important factors, in my view, in shaping future developments in press advertising, but more particularly in poster design. Although I have already referred to these as separate influences, I wish now to consider their amalgamation in the same composition. Together they form the means of expressing the graphic language of advertising in terms of what I shall call the "New Realism".

The study of Abstract Art provides the designer with an understanding of the principles of space division, and thus enables him to appreciate, as it were, the

scaffolding behind reality. The Dutch painter, Piet Mondrian, who died recently in America, and Ben Nicholson, working in this country, are the best known painters in this field.

A parallel study of Surrealism stimulates the designer to appreciate a new possibility of pictorial expression, whereby diverse objects can be used together in one picture. The need for a form of dual imagery often arises in advertising. For example, an air transport announcement may require the most convincing images of the separate notions of "comfort" and "speed" to be combined into one pictorial unit. Salvador Dali probably reaches the greatest extremes, in the imaginative invention and association of diverse images, in such paintings as his soft watches and fried eggs in a landscape.

The principles of Abstract Art can often be used *alone* for an advertisement or poster design, with striking results, but for the majority of advertising problems this method tends to be cold and lacking in humanity. On the other hand Surrealism used *alone* can also be effective (Dali has already done paintings for press advertisements in America). But after its initial eye-catching shock it distracts attention, since its tendency to amorphous composition lacks the strength and unity, necessary in advertising design, to express the central idea. If, separately, the two methods of approach are rarely satisfactory, together, they can make an invincible graphic combination. That is to say, the designer is stimulated by the freedom of imagery suggested by Surrealism, while realising the necessity of fusing these images together inside the structural support of abstract composition. Only thus can the appropriate image combinations be displayed in relation to the text in a convincing and forceful way.

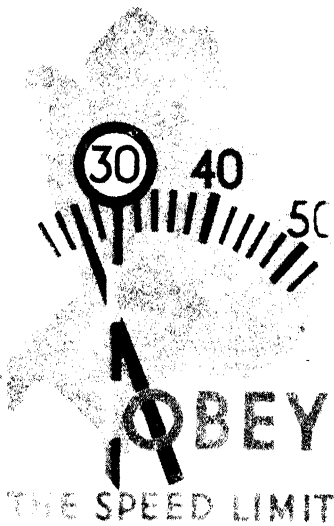
This attitude to commercial design was beginning to find expression in the work of many of the leading designers before the war. It was (and still is) apparent in America, in the advertising of the Container Corporation; also, particularly in the work of Herbert Bayer, Lester Beall, and Paul Rand, and during the war in the work of Jean Carlu and McKnight Kauffer; and also in this country in the war posters of Lewitt-Him, Pat Keely, Hans Schlegel, Henrion and Games. I have already shown in Fig. 5 two examples of this New Realism in press advertisement design.

As I have said already press advertising in this country is still too restricted, but in poster design the new developments are more apparent. To illustrate this I have chosen two 1947 designs, one by Pat Keely, and the other by Games (Fig. 6 (a) and (b)).

The "Obey the speed limit" poster of Keely's is a perfect example of the "New Realism". By means of a surrealist approach the designer succeeds in expressing lucidly the inexpressible! His appreciation of abstract construction not only fuses but stabilises the surrealist assemblage of images. To those of us who are drivers, each of these images exists in our experience, and here they are correlated in their most expressive form. The "30" of the signpost coincides cleverly with the position of the right eye of the driver, as well as stressing the "30" mark on the speedometer dial. The indicator needle, its angle contrasting with the vertical upright of the signpost, finds its pivot most conveniently in the centre of the "o" of the key word in the slogan. The silhouetted mass, expressing the idea of "driver" in its most summary and recognizable form, unifies all the elements, and thus welds the

design into a single impact. The total effect is a visual telegram—clean, simple, and emphatic—yet what inner complexities have been resolved by the designer!

In the Metropolitan Police poster by Games, again we have the imaginative surrealist approach. Here we have a graphic invention—an ingeniously compounded double image, integrating two separate facts into one, and a form of expression specially evolved for advertising, and required in no other field of graphic design. It exemplifies the “New Realism” because it is direct communication of ideas concentrated into the unique visual form. It shares with the scientific formula an exactness and economy of statement. Nothing is irrelevant, nothing added for effect or decoration. The visual ingredients are elementary, yet Games has discovered their formal affinities, and exploiting these has created an amalgam of



(a)



(b)

FIG. 6 (a) Poster designed by Pat Keely, F.S.I.A., for The Royal Society for the Prevention of Accidents, 1947
(b) Poster designed by Abram Games, F.S.I.A., for The Metropolitan Police, 1947

graphic force and simplicity. It is “art of interruption” of a high order, because the “means” of attracting our attention are also the “end” of the poster.

To sum up what has had to be a brief survey of quite a long train of events, I think that Commercial Design for Advertising has exciting possibilities in front of it. I have tried to show the changes in technique since the end of the 19th century, resulting from the influence of the developing trends of the time, in Art, in Architecture, and in the Applied Arts. As time goes on new and different influences will in turn play their part in solving the design problems created by an age, which is becoming increasingly aware of the value of a high aesthetic standard in the appearance of everyday things.

EXHIBITION DISPLAY

By JAMES GARDNER, O.B.E., R.D.I., M.S.I.A.

Delivered on 24th November, 1947

Exhibition display covers a wide field of activity having no clearly defined boundaries. It would be simple to limit observations to the more important international exhibitions, trace lines of development in display technique and compare some contemporary examples. While fruitful in illustration and argument, conclusions drawn from this material would be a matter of personal judgment, and, I am sure, would not reveal the basic element behind all successful exhibition display.

Display and Mass Emotion.—The word "Exhibition" immediately conjures up pictures and emotions in my mind—not pictures of individual exhibits or isolated features, but something much wider. With the Paris 1937 Exposition, I recall a sense of excitement, a large emotional experience associated with the show as a whole. The effect of the whole is much greater than and different from the sum of the parts. How is this achieved? Is it designed or accidental? I think we shall find that the answer is in the people who visit the show, something within them, which is excited and reacts to the successful presentation of an idea, and this I call mass emotion. It is difficult to analyse and still more difficult to express the effect of visual display on a community of people, but I will attempt to pick out that thread, which I think important, through the varied patterns of public displays.

We have, in common with members of all communities, a number of different loyalties and impulses, each of which must find satisfaction or, in the long run, the organized community breaks down. One loyalty is to our family and the home, one is to our associates in work or leisure, and one is associated with the community group as a whole. The latter is the emotion which is stirred by a successful public exhibition. As small personal individuals, each a part of the large community, we need that whole to be defined, and here visual display can take the stage by representing our group feeling visually. I suggest that people as a whole feel such a real need for the satisfaction of this emotion, that they will accept a display that is a distorted or fairy-tale representation of the group idea for want of a better.

If we examine dispassionately the tie which the Royalty idea, with its display of pageantry, has in linking together the peoples of the Commonwealth and other peoples who are not subjects, we will find it difficult to explain in everyday terms. I suggest that this pageantry, related to a world of the past, survives because it satisfies the need for a visual display of the community idea, and that if it did not take this form, it would find some other outlet of expression.

Display associated with Leadership.—Display has taken varied forms to satisfy this mass emotional requirement, but I suppose the basic public reaction to popular display has been much the same at all times. In tracing the thread of display back, we find it at first interwoven with the development of leadership and kingship. Early communities, even when they were little more than family groups, had developed exhibition display as a part of their social equipment. The show would

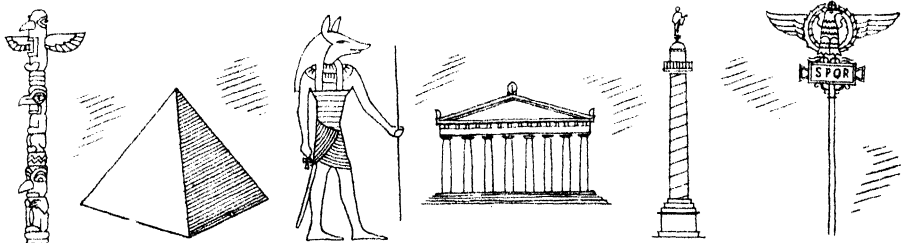
be centred around the leader of the group, the king. The exhibition manager would be the witch doctor. The technique might include chalk, clay, blood, bone ornaments, and ceremonial display features such as the totem pole. These primitive shows were surely not just advertising stunts to bolster up the authority of the king idea; this was already established. I suggest that such displays became an integral part of early social development, because these small groups of rather frightened people felt more secure with this visual demonstration of their common identity and aim. Loyalty to home and immediate associates was not enough.

It is of interest that simple music also served to satisfy this mass emotion. A type of sound pattern which is now again popular with younger people lost in the complexities of contemporary society, tom-tom music has become swing. This example may be a long way from present day exhibition technique, but is interesting in that it shows the important part played by public display, when social equipment was rudimentary and men concentrated on the simple essentials.

As communities became more complicated in pattern, display centred around changing themes. In the Nile Valley the theme was the King—God and Immortality. Here a long tradition allowed the development of craftsmen and artists skilled in display technique. The chief features were processional ways, great tombs and monuments, a huge scale, mural decoration in paint and relief, drapes and decorative ceremonial dress, and symbols. These great centralized displays, sponsored by the hereditary kings and priests, and executed by trained organisers and craftsmen, at one time so engaged the available labour force that the building of the great pyramids nearly ruined Egypt—an interesting contrast with to-day, when display crops up at every street corner in the world, sponsored by tradesmen and trading groups, and the technique employed is international.

Moses centred the common loyalty of the wandering Israelites round a Sacred Tabernacle, and we have detailed descriptions of its construction, though I cannot recall having seen a reconstruction of this. And in the democracies of ancient Greece public display centred on abstract figures representing virtues and hopes, the Pagan Gods, and around the public sports areas and theatres, the first Civic Centres, I suppose. Here we see brilliant colours and ingenious architectural lay-outs.

During the period of Roman expansion, exhibition display took many forms—vast architectural themes, elaborate applied decoration, the great textile drapes we now term velariums, processions with symbols of authority and trophies somewhat reminiscent of the totem pole. These would be carved aloft along the



Tribe - Dynasty - Powers Godlike, Military & Consular

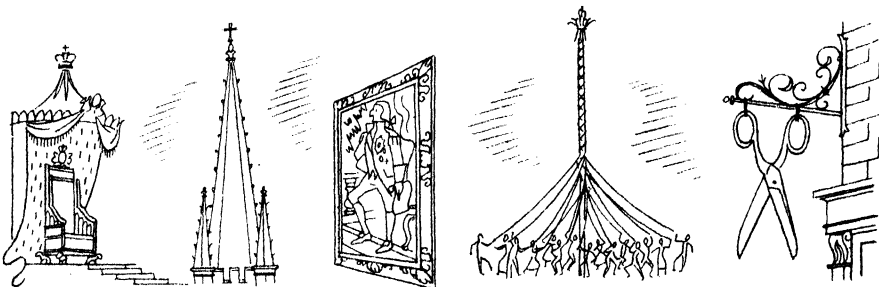
roads throughout the empire as a trade mark to indicate that "This is a representative of the genuine Roman organisation". As war became an increasing burden on the people, exhibitionism increased. Trophies were paraded, and more and more monumental structures were erected, and garnished with yet more trophies. Here, perhaps, display had gone a bit to seed, and had become at times rather gross, a method of exciting loyalty rather than a fulfilment of public demand.

Later the pattern of the display thread became interwoven with the powers of the Church and the King. The elaborate display of artistry around the throne developed in the old tradition, but in the growing influence of the Church new themes were developed. We see Gothic spires, serving no architectural purpose other than as display features, and processional pageantry with new symbols and new forms of ceremonial dress. Then there were elaborate tombs and biers, three dimensional set pieces which we now call dioramas, mural decorations, the use of colour in marble, enamel, stained glass and reflecting surfaces of metal, and the use of perfumes. Here the continuous development of a technique resulted in a perfect harmony of space, lighting, sound and visual effect.

And so we pass through the period of prolific Renaissance display, when the designers achieved personal reputations, to the heraldic devices and marks of the civic authorities and Guilds. Here we have a new theme, display sponsored by principalities and merchants. A picture of Venice in the hey-day of her maritime success is worth recalling. There have been periodic revivals of community display centred around Kings and Leaders, culminating in the brilliant displays around the Louis in France, and after an interval of social disturbance, this type of display is revived by Napoleon, bringing with it echoes of the older displays of Rome and Egypt.

Display of and for the People.—From this period display is more diffused, but it is used in a no less important way to advertise, and build up the theme of "aristocracy": palatial houses, elaborate furniture, paintings and statues of personalities, posed in such a manner and with such associated features as to add dignity and stature, and, of course, the coach with footmen and outriders. Painters dealt with these themes so effectively that I think their portraits and conversation pieces set an ideal which the "aristocracy" found it necessary, in public, to follow. The public accepted these displays because they filled the need for a visual show of the leadership and aim of the group.

Apart from the general use of display by the aristocracy, we have some



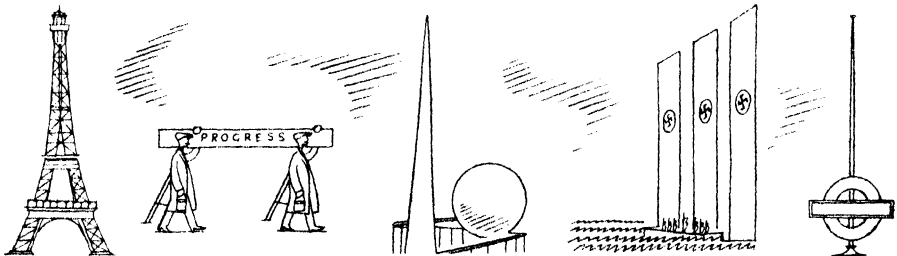
Kingship - Church - Aristocracy - The People - Tradesmen

outstanding "shows". The Prince Regent had his Pavilion at Brighton, prominent leaders in society organized individual displays, often around a public charity theme—they organized masques and Fêtes. These were a success with the tradesmen and public, and displays of a similar nature appeared at Ranelagh, Vauxhall Gardens and Earl's Court. We have regattas and firework displays, and permanent halls were erected such as the Egyptian Hall and the Pantheon. Designers, in search of ideas with public appeal, revived techniques from the past, and so we see a faint echo of the Nile Valley on the stucco facing of Egyptian Hall, Piccadilly, and at Brighton the Pavilion had for its exterior theme an Indian Palace and a Chinoiserie interior!

Display of Goods.—Now as wealth spread more widely and commodities were available to an ever increasing number of people, community display took the form which we recognize to-day. Houses were fitted with large glass windows, with elaborate surrounds and with illumination, designed for the presentation of merchandise. Symbols and signs, the marks of trade, were displayed first in three dimensional form, then in relief, then as painting and, finally, in print. Meanwhile, the merchants were holding public markets and fairs in the open, and individual displays under awnings, the whole usually dominated by the Town Hall of some provincial centre. Agricultural fairs developed and some trade fairs gained an international reputation.

Display becomes "Exhibition".—Paris became the centre for a five-yearly Industrial Exhibition which attracted many English visitors, and the word "Exhibition" became a name. Now in 1847 the Prince Consort became President of this Society and the Queen granted it a Royal Charter. The Society held the first of three annual Exhibitions of "Art Manufactures", intended in Prince Albert's words "to wed mechanical skill with high art", a reminder of this Society's interest in what we now term Industrial Design. At this time the Charity Fête developed into a great "Bazaar of British Manufactures" held at Covent Garden to augment the funds of the Anti-Corn-Law League. And while Paris held her eleventh Exposition, we come to the great 1851 Exhibition in Hyde Park, the greatest of all exhibitions, and remembered to-day in the Crystal Palace. This, the most revolutionary and specialised structure ever built for an exhibition, was designed by Paxton, the Duke of Devonshire's landscape gardener. This exhibition, our first International display, can be considered in terms of to-day, since it was carried out with contemporary technique.

It is interesting, in view of the great influence which this fantastic structure has



Art - Industry - Commerce - Enterprise - Authority - Service

had, to reflect that it began as a last minute sketch on a piece of blotting paper. As we all know, no design has never originated from a committee, and the committee deputed to select a design for this exhibition was no exception. After much discussion it could agree on none, and so proposed a design of its own to be executed by Brunel—a monstrosity of a low brick building with false arches, pressed down to earth by a vast sheet iron dome. This was already out to contract when Paxton, with his experience in enclosing large spaces economically when erecting greenhouses, had the “Crystal Palace” idea. This Crystal Palace so appealed to the public imagination that the Exhibition’s success was assured. Inside there were gathered examples of fine handcraftsmanship, some ideas and inventions, and a few machine-made articles which were so devised and decorated as to have superficially the appearance of being hand-made. The layout of the displays was not as inspired as the building, being a mixture of “Bazaar” technique on a larger scale with the traditional “museum” type of display. The inclusion of living trees within the structure, due to their position on the site, resulted in an original display feature, a foil to the formal lines of the building.

International Exhibitions and Trade Fairs were now an accepted part of community life. An outstanding feature which comes to mind is the Eiffel Tower, surely the finest display structure produced by our western industrial communities. The first exhibition I visited was a complete city in plaster Rococo—“The White City”—which again, caught the public imagination. Here was an amusement park, a ridiculous “Flip Flap”, a scenic railway, canals with Venetian Gondolas, and some elaborate lighting effects. In this we have all the elements of a pattern, which is repeated with variations in all the large scale exhibitions which follow. Wembley repeated the theme, but much of it in concrete—a sprawling layout, large in extent but small in concept.

Signs of Changing Technique.—So many exhibitions now are a fleeting panorama of plaster, steel and glass, of imitations and fantasies, such as a full-scale reproduction of Canada’s Parliament House alongside copies of the Crystal Palace, Eastern temples, native villages, “half timbered” cottages and pompous monuments, some of which are permanently recorded in the industrial buildings, which appeared almost overnight, along the Great West Road. Alongside these gigantic hat boxes and elaborate plaster caskets, some smaller simpler structures appeared, erected economically from contemporary building materials, and honest, pleasant and human in scale. Notable examples of these were the Swedish, Finnish and Swiss Pavilions at the Paris 1937 Exposition; while interesting contrasts were the German and Russian Pavilions vying with each other to be the highest and most imposing monument in the whole show.

The New York World Fair was, I suppose, a direct development of the “Wembley” tradition—but much more expensive and elaborate. The Italian International Exhibition, preparation of which was interrupted by the war, would have been of interest—a complete marble city on the outskirts of Rome, to remain as a permanent city, a monument to the Mussolini Era. As one would suppose, it was to have been a pompous formal scheme, a reminder in theme, if not in style, of the processional ways and temples of Ancient Egypt. When I saw it in 1945, it was already a ruin and occupied by our Royal Engineer Workshops.

The Publicity Technique.—So far, the examples have been of exhibition building design, for it is only recently that design has been based on the goods to be displayed or built around a story to be told. The advertising profession had not been very interested in exhibitions, leaving these to contractors and a few specialist architects. Advertising publicity was too closely linked to space selling and the two-dimensional layout. Nevertheless, a few of the larger commercial interests staged shows prior to the war. These were quite new in concept and designers, experienced in publicity technique, told a story in three-dimensions. The interest here was in the visitors' reaction to the exhibits, and an architectural façade was non-existent.

During the last war, the M.O.I. exhibition department perfected and stabilized



FIG. 1.—“*Shopwindow Street*”, *Britain Can Make It* Exhibition (London, 1946)

this technique. The “layout” and typography of publicity pamphlets was transferred to the wall in three-dimensional planes with novelty in materials, lighting and construction to give relief and interest. Here we have exhibition display appealing to the loyalty of the community in a new democratic guise. The old symbols of pageantry became fresh and exciting in the hands of practised publicity designers. Many of these exhibitions were specially designed to travel from town to town, while in the Army the travelling display became a method of training, under the name of “a circus”.

We might note at this stage that in Germany community display was used with a great efficiency to weld the people together into the Nazi idea, the people themselves being used at times as mass display material. We saw here another revival—the totem pole motif of the Roman Empire.

Display To-day.—The design of "Britain Can Make It" commenced immediately after the recent hostilities ceased and was, I consider, an experiment. Here was no consecutive story, and no propaganda theme, which could be treated with the now accepted "publicity" technique. Some goods (at the time of planning no one knew

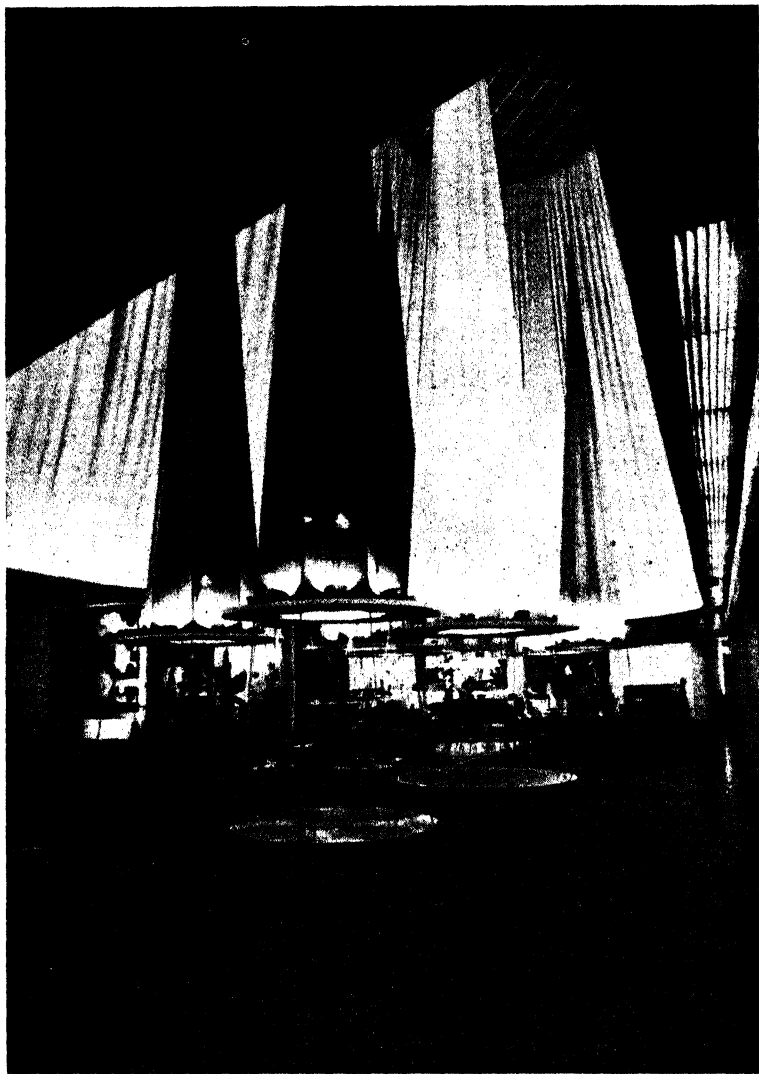


FIG. 2.—*Commodity Display, Enterprise Scotland Exhibition*
(Edinburgh, 1947)

how many or how good) were to be presented in a background which would catch the popular imagination, and it was to be a design stimulant. The resultant technique was borrowed much from the theatre, the pantomime and the circus, the aim being to achieve an interesting atmosphere, and to give the visitor some

emotional experience, and some "fun". The breakaway from architectural treatment of hall, focal point, main axis, etc., on the one hand, and the publicity layout of a story sequence, on the other, still requires study and development before it can be more than a series of ideas and episodes.

The annual British Industries Fair is, and should be, a development from the provincial Fair or market: a series of individual displays competing for the buyers' attention. Ideas here should generate from the exhibitors, and apart from some control of layout, scale and colour, the whole can only be given unity by the introduction of some dominating theme or feature, which could fill the place of the Town Hall which so happily used to complete the country market.

The Future of Display.—Remembering the examples of early communal display, it is to me clear that we could well use this technique more generally in our community. I would like to see the display technique, now confined to the "Exhibition" as such, used by local authorities and by leaders of working communities, at the country fair, at our sporting events, and at all times of a public celebration or gathering. At the same time we should remember the displays of pageantry and heraldry in, say, Italy during the Renaissance, when each district vied with another in popular public demonstrations of civic pride. I think that a sense of pageantry is still alive in the British and that our exhibition display technicians are, at the moment, in advance of any others in the world.

We, who produced the Great 1851 Exhibition, need not borrow ideas from abroad. Ahead is the 1951 Exhibition, which should be as new in concept as was that of 1851 in its time. Finally, I hope I have been able to substantiate my belief that in exhibition display we have a means of uplifting and knitting together the people in a common purpose.

OBITUARY

JAMES HOGAN.—We regret to announce the death in London on Monday, January 12th, of Mr. James Hogan, R.D.I. James Humphries Hogan had been a Fellow of the Society since 1932. He was appointed a Royal Designer for Industry in 1936 in recognition of his outstanding work in the design of glass and was Master of the Faculty of Royal Designers for Industry from 1941-42. He read several papers to the Society—on "Design and Form in Glassware" (1933), for which he received a silver medal; on "English Design in Glassware" (1935); on "Stained Glass" (1940); and on "Pottery, Glass and Plastics" (1942). He was to have read a further paper to the Society this February, in the Craftsmanship Series, on "The Craft of the Glassblower".

Hogan, who was art director of James Powell & Sons (Whitefriars), was responsible for many stained glass windows in cathedrals and churches in this country, the Dominions and America, his most important work probably being the two 100-feet high windows in Liverpool Cathedral. Besides his stained glass designs he produced many for decorative and table glass-ware. Among his works in this field were the commemoration bowl presented to King George V on his jubilee by the Glass-sellers' Company, and seven pieces of table glass, executed at the Whitefriars Works and exhibited at the 1935 Exhibition of British Art in Industry at Burlington House.

Hogan said that he drew his chief inspirations from York Minster, and from the Cathedrals of Chartres and Leon. He had studied art at the Westminster School of Art, the Central School of Arts and Crafts and the Camberwell School of Arts and Crafts, and was a member of the Art Workers' Guild and of the Arts and Crafts Exhibition Society, a Fellow of the Society of Master Glass-Painters and a fairly frequent exhibitor at the Royal Academy.

Mr. Gordon Russell, C.B.E., M.C., R.D.I., Master of the Faculty of Royal Designers for Industry, writes:—

It must be nearly twenty-five years since James Hogan gave up part of his studio space at James Powell & Sons' shop in Wigmore Street at their request, for a small exhibition of my work. We had many talks mainly about glass and since then I have been in touch with him and with the remarkable firm with which he was connected for so long.

Hogan designed glass for quantity production, hand-made glass and stained glass windows. He designed them all with zest, imagination and sympathy. But that range of work, immense as it was, showed but one side of his character. Like many artists of the Renaissance he was a competent and reliable man of affairs. Business was a part of life, and he found life interesting. On a number of occasions he travelled to America and other countries for his firm. And he was successful because he was a person who always wished to contribute, in a quiet, unobtrusive way, to any social group with which he became connected. His bluff, downright manner, his obvious sincerity and deep knowledge, coupled with political wisdom, which designers so often lack, made him a valued councillor at many gatherings. Hogan was no biased partisan for hand or machine. He wanted to see good things made and he was a man of his age.

Many of the signposts to the future are knocked down to-day, so that a sense of direction and belief in real values are absolutely vital. Men like Hogan leave these in our care. We must see to it that we carry on as faithfully.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

TUESDAY, FEBRUARY 3. Architects, Royal Institute of British, W.I. 6 p.m. H. G. Goddard, "Effect of Services on Planning and Design."

Bibliography, British Society for International, at the Institution of Electrical Engineers, W.C.2. 2.30 p.m. Dr. A. Malcolm Dyson, "International Chemical Abstracts and the new notation for Organic Chemistry." East India Association, at Overseas House, S.W.1. 2.30 p.m. Sir Percival Griffiths, "India Revisited: The First Winter of Partition."

WEDNESDAY, FEBRUARY 4. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. J. H. H. Merriman and R. W. White, "The Application of Frequency Modulation to V.H.F. Multi-Channel Radio-telephony."

Kinematograph Society, British, at the Wellcome Foundation, N.W.1. 7.15 p.m. W. Buckstone, "Light Efficiency of Projectors."

Public Analysts, Society of, at the Chemical Society, W.1. 7 p.m. D. W. Kent-Jones, A. J. Amos, P. S. Elias, R. C. A. Bradshaw and G. B. Thackray, "The Micro-Analytical Test for Purity in Food, with special reference to Cereals."

THURSDAY, FEBRUARY 5. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. L. C. Pocock, "A Survey of the Telephone Rating Problem."

Fuel, Institute of, at the Institution of Mechanical Engineers, S.W.1. 2.30 p.m. J. Sinclair Kerr, "The Application of Fuel Oil and Surplus Gas at an Integrated Iron and Steel Works."

Royal Society, Burlington House, W.1. 4.30 p.m. C. H. Kellaway, "The Wellcome Research Institution."

FRIDAY, FEBRUARY 6. Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. T. Schur, "Power Transmission in Diesel Electric Locomotives."

Mechanical Engineers, Institution of, Storey's Gate, S.W.1. 5.30 p.m. (1) Dr. E. C. Wadlow, "Mechanical Engineering Aspects of Naval Mining."

(2) J. M. Kirkby, "Some Mechanical Features in Anti-Submarine Weapons."

Sanitary Institute, Royal, at the Pavilion, Sea Front, Exmouth. 10.30 a.m. R. J. Humphreys, "Post-War Public Works in Exmouth—Effectuated and Projected."

TUESDAY, FEBRUARY 10. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. G. H. Watson, "The Maintenance of Television Receivers in the Home"

Hull Chemical and Engineering Society, at the Church Institute, Hull. 7.30 p.m. W. N. McNicol, "The Relationship of Science to Salesmanship."

Industrial Transport Association, at the Grand Hotel, Broad Street, Bristol. G. R. Guest, "The High Speed Diesel Engine."

WEDNESDAY, FEBRUARY 11. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. T. W. Ross and R. M. A. Smith, "Centralized Ripple Control on the High-Voltage Networks."

Engineers-in-Charge, Institution of, at E.L.M.A., Savoy Hill, W.C.2. 6.30 p.m. A. C. F. Mackadam, "Industrial Infra Red (Radiant Heating)."

Kinematograph Society, British, at the G.B. Theatre, Wardour Street, W.1. 7.15 p.m. B. Everest and F. Hudson, "Some Thoughts on Metals in Kinema and Related Equipment."

Petroleum, Institute of, at Manson House, 26 Portland Place, W.1. 5.30 p.m. Dr. Ir. N. J. M. Tavernier, "Aerial Photography and Exploration for Oil."

Physical Society, at the National Gallery, W.C.2. 6.15 p.m. Dr. D. R. Duncan, "The Classification of Colour Mixture Phenomena."

Sanitary Institute, Royal, 90 Buckingham Palace Road, S.W.1. 2.30 p.m. R. A. H. Livett, "House Refuse: Improved Methods of Collection and Disposal."

Textile Institute, 16 St. Mary's Parsonage, Manchester 3. 6 p.m. J. Hull, "Importance of Design and Colour in Textiles for Home and Export Markets."

THURSDAY, FEBRUARY 12. Design and Industries Association, at the Royal Society of Arts, W.C.2. 1.30 p.m. Hon. Josiah Wedgwood, F. C. Hooper and Miss M. Tennant, "Industrial Design—Whose Responsibility?"

Dyers and Colourists, Society of, at the Great Northern Victoria Hotel, Bradford. 7.15 p.m. G. H. Lister, "An Investigation into the Practical Aspects of the Absorption of Acid and Chrome Dyes by Wool."

Electrical Engineers, Institution of, Savoy Place, W. C. 2. 5.30 p.m. C. A. Cameron Brown and E. W. Golding, "The Application of Electricity to Horticulture."

Metals, Institute of, 4 Grosvenor Gardens, S.W.1. 7 p.m. Dr. H. Sutton, "Metallurgical Problems of Importance in Aircraft."

Photographic Society, Royal, 16 Prince's Gate, S.W.7. 7 p.m. R. McV. Weston, "The Importance of Illumination in Photomicrography."

Royal Society, Burlington House, W.1. 4.30 p.m. (1) H. L. Axon and W. Hume Rothery, "Lattice Spacings of Solid Solutions of Different Elements in Aluminium." (2) B. Chalmers, R. King and R. Shuttleworth, "The Thermal Etching of Silver."

FRIDAY, FEBRUARY 13. Textile Institute, 16 St. Mary's Parsonage, Manchester 3. 1 p.m. I. E. Fielden, "Electronics in the Textile Industry."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4762

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

WEDNESDAY, FEBRUARY 18TH, at 2.30 p.m.—A symposium of four travel reports on “DESIGN IN SCANDINAVIA”. By Harry Booth, Winifred Ives, Leslie Morton and Reeve Ronder, prize-winners in the Society’s Industrial Art Bursaries Competition. Oswald P. Milne, F.R.I.B.A., Chairman of the Industrial Art Bursaries Board, will preside. (The reports will be illustrated by lantern slides.)

WEDNESDAY, FEBRUARY 25TH, at 2.30 p.m.—“THREE-DIMENSIONAL PHOTOGRAPHY”. By C. Butement, Research Manager, Deep Pictures, Ltd. Sir Edward Crowe, K.C.M.G., a Vice-President of the Society, will preside. (The paper will be illustrated.)

CHANGE OF DATE OF MEETING

Mr. J. Seymour Lindsay’s paper on “Metalwork” in the Craftsmanship Series, which had been arranged for April 7th, has been brought forward and will now be read on March 3rd. Mr. W. A. Thorpe, of the Victoria and Albert Museum, will give the sixth lecture in this series on “Codes of Work in Glass History” on April 7th.

TOYNBEE HALL AND THE UNIVERSITY SETTLEMENTS

By Major LIONEL F. ELLIS, C.V.O., C.B.E., D.S.O., M.C.,
Associate Warden, Toynbee Hall

Seventh Ordinary Meeting, Wednesday, January 14th, 1948

The Rt. Hon. Sir JOHN ANDERSON, G.C.B., G.C.S.I., G.C.I.E., F.R.S., M.P., *in the Chair*

THE CHAIRMAN: It is my privilege to introduce to you this afternoon Major Lionel Ellis, who is going to talk on a subject on which he is peculiarly qualified to speak, because he is the Associate Warden of Toynbee Hall, which is a pioneer in settlement work. He is also, he tells me, the Chairman of the British Association of Residential Settlements, an organisation comprising the various residential settlements up and down the country.

The following paper was then read:

A finer art than I possess would be needed to trace the evolution of the group of institutions covered by the title of this paper, and to draw the picture of their development in true perspective. For that would involve an account of social progress during the past sixty-five years and an evaluation of the part which Settlements have played

in it; and I am not competent for either task. I can only make a much humbler attempt to distinguish the main characteristic of the Settlements and to suggest the measure of its importance. In my ignorance I shall doubtless overlook much that might have made this sketch less sketchy. I can only hope that something of the significance of the theme will be apparent notwithstanding the fumbling touch of the amateur. It is significant for it concerns the most difficult of all the arts—the art of living together. The principles of that art are not yet fully understood and the practice of it, in the world to-day, is dangerously imperfect. Yet the future of mankind depends on its mastery.

In a sense, the story of the Settlements begins on Christmas Eve, 1884, when men from Oxford and Cambridge first came into residence at Toynbee Hall. But in another and equally true sense it should begin well before that date. G. M. Trevelyan has pointed out that one of the difficulties of an attempt to write social history is “the absence of determining events and positive dates by which the course of things can be checked. The social customs of men and women and their economic circumstances, particularly in modern times, are always in movement, but they never change completely or all at once. The old overlaps the new so much that often it is a question whether to ascribe some tendency in thought or practice to one generation or the next”.¹ Thus, before Toynbee Hall was opened, Ruskin, Maurice and the Christian Socialists, and Edward Denison and Arnold Toynbee—and Samuel Barnett—had pioneered the way, and a new chapter of social history was opening. In 1881, John Morley wrote “we find the rather amazing result that in the country where socialism has been less talked about than any other country in Europe, its principles have been more extensively applied”.² But his amazement can hardly be so great as ours at finding that he could say this at a time when none of the developments with which we are familiar to-day had yet been dreamed of; when none of the public social services which we take for granted had yet been initiated; when the doctrine of *laissez faire* still kept the ring for the free fight of competitive forces, only allowing authority to step in to prevent the most glaring fouls, or, as Professor Bernard Bosanquet put it, “to hinder hindrances” to the triumphant progress which free competition was confidently expected to ensure.

The time at which Morley wrote, when the idea of the Settlement was taking shape in the mind of an East End parson, was only sixty odd years ago—well within the space of a lifetime. Yet conditions were so different then that unless we succeed in recapturing their main features—in so far as they concern our subject—we cannot understand the Settlement movement. Let me refresh your memories. Compulsory attendance of children at elementary schools was only made universal in 1880 and even then it was not made universally free. And though there was the Poor Law to prevent starvation, and some factory legislation to prevent the exploitation of labour in its grosser forms, and Health Acts to prevent nuisances likely to cause the spread of disease, yet these expressed little more than a recognition of the State's duty to overcome such hindrances to social progress as illiteracy, abuse of human labour, the spread of infection and disease, or personal misconduct. The progress of the Industrial Revolution had meanwhile “increased the disparity of wealth between the very rich and the very poor, and had segregated classes geographically by substituting great cities divided into various social quarters, in place of the life of villages and

market towns with some features and interests common to all".³ If Disraeli's saying that England was divided into two nations, rich and poor, was as inaccurate as most aphorisms of the kind, it is at least true that unprecedented wealth and prosperity was written large in the "West End" of London and that unparalleled poverty, squalor and degradation was written no less clearly in the "East End". And the separation of the two was almost complete.

St. Jude's, Whitechapel, where Samuel Barnett was vicar, was, with the exception of two or three narrow streets, "covered with a network of courts and alleys. None of these courts had roads. In some the houses were three storeys high and hardly six feet apart, the sanitary accommodation being pits in the cellars: in other courts the houses were lower, wooden and dilapidated, a stand-pipe at the end providing the only water. Each chamber was the home of a family. . . . If the men worked at all it was as casual dock labourers But usually they did not work; they stole or received stolen goods, they hawked, begged and cadged, lived on each other with generous indiscrimination, drank, gambled, fought, and when they became too well known to the police, moved on to another neighbourhood".⁴ To the mass of people crowded into these slums the bottle in the cupboard and the warmth and welcome of the gin-palace and the pub offered almost the only form of relief, and widespread drunkenness added to the squalor and degradation of gross overcrowding in bestial conditions. Apart from the elementary education provided for young children nothing at all was offered to those above school age. There were no cheap, popular newspapers, no wireless, no cinemas, no dogs. There was for them no electric light or power and only a quite inadequate and incomplete system of water supply and drainage. Try to picture what life in East London was like in those days!

Samuel Barnett was a man of deep spiritual insight and a clarity of vision which amounted to genius. He was also a man of great courage. In a large correspondence and much writing there is no evidence that he was ever seriously discouraged, or that he ever faltered on the way which he had chosen. Surrounded by an almost unrelieved mass of misery he yet complained "Too often has the East End been described as if its inhabitants were pressed down by poverty, and every spiritual effort for its reformation has been supported by means which aim only at reducing suffering. In my eyes the pain which belongs to the winter cold is not so terrible as the drunkenness with which the summer heat seems to fill our streets, and the want of clothes does not so loudly call for remedy as the want of interest and culture Anything which mars the grandeur of human life must be brought under a converting influence. Such influences are the culture which opens to men's minds the enjoyment of art and literature: the knowledge which makes the whole world alive and binds together the human family by ties of common interest; the religion which raises men" ⁵ To open men's minds, to spread "the knowledge which makes the whole world alive"—that was Barnett's purpose. And it was to promote that purpose that he spoke at a meeting in St. John's College, Oxford, in November, 1883. To bridge the gulf between learning and labour he urged the establishment of a Settlement of University men where, living together and making friends with their neighbours they would "share their best" with them and themselves "learn through feeling". "Nothing that is divine", he said, "is alien to man, and nothing which can be learnt at the University is too good for East London".⁶ In that last sentence is

expressed Barnett's faith and it is the faith that has inspired Settlement work ever since. Behind it lies the conviction that knowledge and understanding are the main-springs of social action and that the surest way to increase knowledge and promote understanding is to practice the art of living together as "neighbours and friends".

It is significant that Barnett suggested no specific programme. It was not in measures but in men that he had faith—men who had been trained to value truth and seek to apprehend beauty; men with open minds and generous hearts who had already learned what it meant to live together in the great society which makes up a university; where difference of opinion leads not to street fights but discussions, and differences of fortune do not separate; and where discipline and liberty combine to secure opportunity alike for the work and leisure which make for the full enjoyment of life. A Settlement of University men in such a neighbourhood as the one in East London which he knew so well seemed to Barnett to offer hopes that, through the spread of knowledge and the growth of mutual understanding which must follow, there would also follow a bridging of the gulf between riches and poverty, east and west. His suggestion met with immediate response, partly, no doubt, because his sincerity was apparent and his conviction infectious, but partly to other circumstances.

Although Morley's account of contemporary social legislation seems to us to be a surprising overstatement yet it is true that about this time, at the end of the 'seventies, there were signs on all hands of a great, though gradual, social upheaval; new claims on the part of the toiling multitude, a new sense of responsibility on the part of the well-to-do.

One of the prophets of this movement was Arnold Toynbee, a young political economist who taught at Balliol College, Oxford, and had lived in Whitechapel for a short time. He had but recently died when Barnett spoke in St. John's College. "Toynbee's sympathy was always with the aspirations of the working class. He was on fire with the idea of a great improvement in their material condition, not indeed as an end in itself, but as opening up possibilities of a higher life. But the practical common sense, which was the constant corrective of his generous idealism, compelled him to recognise that such improvement was not to be attained by uninstructed enthusiasm. There was plenty of energy and goodwill already. What was needed was guidance, and guidance could only come from those who had studied the laws governing the production and distribution of wealth, and knew how, and how far, the blind forces of competition and self interest might be utilised by corporate action for the common good. It was from this point of view that he approached the study of Political Economy. For the sake of religion he had become a social reformer; for the sake of social reform he became an economist".⁷ It would be out of place to say more of him and his work here, but it would be equally mistaken not to recognise the profound influence he had on his generation and on many of the men who listened to Barnett's suggestion. And it was fitting that when the Universities' Settlement in East London was founded in the year after his death it should be named Toynbee Hall.

After Barnett had spoken, committees were set up in Oxford and London to implement his proposal. Among the membership of the former were A. L. Smith, T. H. Warren, and Michael Sadler (all to become famous heads of colleges), Sidney

Ball, Bolton King and Arthur Ackland. The London Committee included Bryce and Alfred Milner. Balliol College, led by Cosmo Lang, afterwards to be Archbishop of Canterbury, raised the funds needed and in due course Barnett himself was appointed Warden. As already mentioned the doors of Toynbee Hall were first opened to residents on Christmas Eve, 1884. Barnett must have been thankful to find how well his formula worked, as from then on he watched the succession of men from Oxford and Cambridge who came to live at Toynbee Hall, and saw how the friendships they made and the knowledge they gained bore fruit in action. Many who served their apprenticeship as residents carried what they had learned into the larger sphere of national affairs, for example, John Gorst, Robert Morant, Hubert Llewellyn Smith. Some like Cyril Jackson and E. J. Urwick took with them into the fields of local government and university teaching the knowledge gained in an intensive study of boy labour or some other question. Two studies which had perhaps the most far-reaching consequences were Charles Booth's monumental survey of "Life and Labour of the People", and William Beveridge's study of "Unemployment". The former was the first scientific attempt to define and to measure poverty. The second led quickly to the initiation of employment exchanges and was the starting point of that long series of measures which have culminated in the National Insurance system. Beveridge was a resident and Sub-Warden of Toynbee Hall from 1903 to 1907.

Meanwhile, the sharing of knowledge was not neglected. The programme for a week in one of the early years included two lectures, nine reading parties, thirty-five classes, meetings of two literary societies, and a concert. Meanwhile also social activities multiplied and there were clubs for young and old, and organisations of many sorts. Toynbee Hall had become a centre of vigorous, many-sided life.

Having seen Toynbee Hall well launched, let us now see what had been happening elsewhere. Barnett had envisaged the Settlement as a microcosm of society—as a place in which people with every variety of religious or political opinion might meet without embarrassment and make friends on equal terms. But, even while the plans for founding Toynbee Hall on those lines were maturing, a second group of Oxford men, led by the Head of Keble College and Henry Scott Holland, decided to form another Settlement in East London, which would differ from Toynbee Hall in its direct association with the Church of England. So the Oxford House in Bethnal Green came into being. In the year that followed, the Settlements which were founded by different groups have varied similarly in their constitution. Some work on a declared religious basis, others do not claim to express any particular faith. Time has shown that there is work in plenty for both sorts and it is in the true temper of the Settlement ideal that Settlements of both types should live together.

In 1887, Oxford and Cambridge Women's Colleges joined in founding the Women's University Settlement in Southwark. In the following year Cambridge House in Camberwell opened. In 1891, Dr. Scott Lidgett started the Settlement in Bermondsey over which, at the age of ninety-three, he still presides. In 1892, a second Women's Settlement opened in Canning Town and in 1895 a third, St. Margaret's House, started work in Bethnal Green. Ancoats Settlement in Manchester was started by Owen's College men—there was as yet no Manchester University—in 1895. Lady Margaret Hall in Lambeth was started by old students of the Oxford

College of that name in 1897. And in the same year Mrs. Humphrey Ward started the Settlement which bears her name in St. Pancras. In that connection I am tempted to quote a letter which Hubert Llewellyn Smith wrote about that time. "By the way, have you read *Robert Elsmere*? I have not and never intended to, but I wished the other day that I had; for it seems that Mrs. Humphrey Ward has an idea of a kind of Toynbee Hall in some part of London and wanted me to talk to her on the subject. So I went and called on Wednesday and talked for an hour or more. She has a very jolly drawing-room, with an original picture of Blake's in it—that is the chief impression left on me". He added—"However she seemed to agree with a good deal that I said, and will probably not act on any of it". From the man who was afterwards described by Mr. Winston Churchill as the greatest civil servant he had ever known, the modesty of that letter is refreshing.

It would be tedious to list the foundation dates of all the Settlements. By 1911, Glasgow, Edinburgh and Dundee, Birmingham, Liverpool and Bristol all had Settlements and more had been established in London. The value of the idea had also been appreciated in the United States and by 1911 more than four hundred Settlements and Neighbourhood Houses had been opened.⁸ The chief social problem of America—the integration of millions of immigrants, often arriving with low standards of living and little education, demanded just the civic and cultural opportunities which the Settlements offered. The task of creating a community from such diverse elements does indeed call for a demonstration of the art of living together. And the Settlements of America have given it with a success which has triumphed over great difficulties.

The first continental Settlement after the pattern of Toynbee Hall was founded in Holland in 1891, and the settlement idea, adapted to the needs and circumstances of each people, has borne fruit in Holland, France, Germany, Sweden, Denmark, Finland, Austria and other lands.

But what, you may ask, have the Settlements achieved in our own country? Professor J. L. Stocks, when asked "what are Settlements for?" pointed out that some of the most essential institutions lack any definite aim though they may incidentally contribute to many. "The human family is such an institution, existing for no single purpose, but creating a common life for its members and thus standing on a basis as broad as life itself; enjoying success so far as the quality of the life which it creates and maintains is good".⁹ Such an institution, he suggested, is the Settlement. And it is just because this "quality of life" is difficult to measure that it is difficult to define what Settlements have done. I will not venture an opinion, but will quote two who had had good opportunities to judge. Lord Baldwin wrote "the sociological researches inspired by Toynbee Hall . . . have deeply influenced the scope and character of British domestic legislation and the training and experience it has provided for many of the most eminent of our administrators and politicians is largely responsible for the great advance which has been made in the social organisation of the country during the last fifty years".¹⁰ And the present Principal of Westfield College has written: "Year by year the Settlements played their zealous parts in the building up of our statutory services. The personal experiences of the settlers helped to mould their shape and speed their growth . . . There is, indeed, scarcely any field of social legislation or any statutory instrument of social service

which does not owe something of its inception or direction to the recorded observations or volunteer pioneer experiments of settlers, who year by year followed the call of Samuel Barnett to those mean streets where their fellow citizens led anxious meagre lives".¹¹

Because a Settlement is not just a building but the family of those who make it their home, Settlements have had their ups and downs and a particular Settlement may flourish or languish for a time. Its achievements are not its own, but those of its members. Who shall measure Beveridge's debt to the fact that he was a resident of Toynbee Hall when he "hammered out his thesis that unemployment is primarily a problem of industry rather than a problem of personal character or particular misfortune"? Or who shall say what credit for his work belongs to Toynbee Hall? Who shall say what men like R. C. K. Ensor or Lawrence Scott owe to their time at the University Settlement in Ancoats, Manchester, or how much of what they learnt from their neighbours there bore fruit in their lives? How much of Lord Woolton's success as Food Minister was due to what he learnt as Warden of Liverpool University Settlement and what was the importance to Mrs. Humphrey Ward and Miss Violet Markham of their association with the Mary Ward and Chesterfield Settlements? There are hundreds more who acquired in Settlements "a capacity for service sharpened by new knowledge and community of thought" and who, through the friendships they made in the neighbouring streets, "enjoyed there a wealth of varied and vitalising interest, colour, humour and cheer, which they had scarcely expected to enjoy".¹² It would be easy to claim for Settlements credit for many social advances; but their finer achievements are to be found not in these but in the lives of settlers and of the neighbours with whom they sought to learn "the art of living together" and through whom they came to understand the full meaning of friendship and what is demanded of true friends.

Finally what of the Settlements to-day? There are about forty in this country. The majority are associated with universities, colleges, schools or churches, but the closeness of their links varies greatly. The work of each Settlement is shaped by local circumstances and financial resources but even more by the interests and abilities of the men and women who live in them. As of yore, all they do expresses an effort to realise, with their neighbours, the best that life has to offer and so most of it is in a true sense educational. Research and the training of entrants to some form of voluntary service or public administration hold an important place in many. Enterprise and experiment characterise the liveliest. There is only room here to take a quick glance at two.

Toynbee Hall maintains its early interest in research and education. It has lately organised an exhibition on the reconstruction of Stepney and has published for popular consumption a booklet on "Living in Stepney". It has upwards of 1,000 evening students. It has schools in drama, music, ballet and painting. Its Little Theatre is the centre in East London of amateur dramatic activity. In this theatre, five years ago, the founding of the Children's Theatre, in which professional actors play to school children, started a Children's Theatre movement. Certain rooms at Toynbee Hall are dedicated to the work of the East London Juvenile Court. The Citizens' Advice Bureau is in session every day, and the Poor Man's Lawyer every week. The Settlement provides accommodation for other organisations whose

interests harmonise with its own, including the Soldiers', Sailors' and Airmen's Families Association, the Invalid Children's Aid Association, and the Skilled Employment Committee. Through the Veterans' Club it cheers and assists Old Age Pensioners. It has organisations of Scouts and Guides, Cubs and Brownies. It has a wide influence in East London because it is free and dispassionate. For twenty years between the wars Toynbee Hall organised an annual Summer School for Americans who wished to know about British and Continental problems and to-day it has affiliations with social workers in America and in Europe and the Dominions.

The University Settlement, Bristol, is a centre of neighbourhood work in an old part of the city, where many social and educational activities are followed; where also research is carried on and where university students of social science are given practical training. But it is more than this for it has off-shoots in the large neighbouring estates built by the city between the two world wars. There members of the Settlement collaborate with the local tenants in developing similar social and educational activities. Within the past few years the Settlement has opened two daughter Settlements of this kind. There, and in the city, it has helped to form new clubs, has acquired a bombed site which voluntary labour has made into a toddlers' playground, has started an international section and opened a Health and Homecraft Centre. Over twenty residents and something like seventy-five voluntary workers are associated in this work. To a far greater extent than was possible in the early days, a large increase of responsibility for the planning and conduct of activities is borne by the people who take part in them, yet members of the Settlement still have an important share in this joint enterprise. For the Settlement is the recognised centre of inspiration and guidance—the *alma mater* of those who in the city and its new estates are trying to evolve a better quality of life and to learn the art of living together. The story of the other Settlements would show contrasts as great as those between Bristol University Settlement and Toynbee Hall, but these two must serve to indicate both the volume and the variety of Settlement work to-day.

Times have changed since the Settlements were founded, and social conditions. Many of the evils which they faced in their early days no longer exist. Means to spread knowledge have multiplied and the sense of mutual responsibility and mutual respect has grown correspondingly. A vast organisation for sharing the national wealth more equitably has been developed through state and municipal services which affect almost every phase of life. There has, indeed, been a social revolution which is not less real because it has been effected without violence. To-day only the impoverishment due to war delays the working out of further measures which would have the common assent of the nation. It is sometimes argued that because of these changes Settlements are no longer needed. I do not share that view.

In some ways the task of the Settlement is more difficult to-day: it seems to me to be correspondingly more important. With the growth of national responsibility two tendencies are observable. The first is the inevitable tendency to design provision for "the average man". Once the right to this or that provision is recognised as universal it must be supplied on terms that have universal application. So there is a tendency to work to a uniform standard. Similarly, the demand for this levelling of provision tends more and more to lead to centralised administration, and the multiplication of "regulations". Yet uniformity in human affairs is only realised

in death; life is infinitely various. The social services are meant to free men for action, not to relieve them of effort. Greater means and more leisure should connote a fuller life and this cannot be achieved by mass-production methods. When national newspapers, wireless, cinemas and commercialised amusements ensure that vast numbers read the same version of news, listen to the same opinions, see the same pictures and watch the same sports, may it not be well that there should still be houses in which men and women with trained minds and sensitive feeling should live together and, with their neighbours, seek to realise in the local community a "quality of life" and a standard of citizenship which is only possible when the art of living together is learnt?

Uninformed criticism of one "class" by another is still common and the prejudice and ignorance on which it is based is not the monopoly of either, any more than are the qualities of courage and endurance, patience, unselfishness and humour which make a common life both possible and lovely. The Settlements if they are true to their tradition offer not a programme of activity but a way of life, and men and women who come to live in them do so in order to gain a share of that "knowledge which makes the whole world alive and binds together the human family in ties of common interest". In the Settlements they should find unlimited friendliness. They should meet people of all ages, of every shade of opinion and great variety of experience. And the better they come to know their neighbours the deeper will be their respect for individual personality and the more clearly will they see that, though rations may be equalised, man does not live by bread alone—for "it is the spirit that maketh alive".

The Settlements are but a small group; judged by size (which is the fashionable way to judge organisations) the Settlement movement is not impressive. But its value depends not on size but on the quality of the men and women who are attracted to Settlements and on the extent to which, in a changing world, they remain true to the principles on which Settlements were founded.

St. Paul's words seem to me to apply most aptly:

"Let us hold fast the profession of our faith without wavering . . . and let us consider one another, to provoke unto love and to good works; not forsaking the assembling of ourselves together, as the manner of some is."

Ref. No.

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2. John Morley. "Life of Cobden", p. 303.
3. G. M. Trevelyan. "English Social History", p. 546.
4. "Canon Barnett—His Life, Work and Friends", by his wife, pp. 73, 74.
5. "Canon Barnett—His Life, Work and Friends", by his wife, pp. 75, 76.
6. J. A. R. Pimlott. "Toynbee Hall", p. 272.
7. Lord Milner. "Arnold Toynbee", pp. 38, 39.
8. A. J. Kennedy on "Social Settlements", in *Encyclopædia Britannica*.
9. M. D. Stocks. "Fifty Years in Every Street", pp. 120, 121.
10. J. J. Malon. "The Story of Toynbee Hall", *Social Service Review*, January, 1939.
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DISCUSSION

THE CHAIRMAN: The subject of Major Ellis's most interesting lecture is now open to discussion and, perhaps, while you are collecting your thoughts it may not be out of place if I offer a few observations.

We are living in a time of great corporations, in which the emphasis always tends to be on planning and organisation. It is refreshing to hear some account of a movement

which does not, as you have heard, rely upon organisation at all; which has, indeed, no formal definition of its aim and purpose and which depends upon personal contacts. I think that if you ask yourselves what the settlement movement in this country has achieved you have only to reflect upon what has been done by those men and women to whom Major Ellis referred, whose names are very well known to all students of social history—Milner and Gorst, Robert Morant, William Beveridge, Violet Markham, Frank Wise, and many others. In that connection is it not true that, if one studies the early history of any great movement, one is bound to be impressed by the importance of the contribution made by a comparatively small number of people of high ideals and conscious purpose? I am sure that in the course of the settlement movement those, who came from universities, colleges, schools or churches, to live in the centres in which the settlements were established, themselves gained in proportion to what they gave. When the question is asked, as Major Ellis put it, "Is there now, in view of the extent to which the State and local authorities have occupied a field which at one time was reserved for voluntary action, less need than there was in the early days for settlements?" I think that, upon reflection, you will probably agree with Major Ellis's conclusion that the need is perhaps even greater now than it was in the past. The task is certainly more difficult, as Major Ellis pointed out, but inasmuch as official action is bound to be confined in the main to stereotyped lines, determined by the requirements of the average man and woman, and as the scope for individual discretion is inevitably limited when the expenditure of public funds is involved, there is still—and, I believe, there will always be—a need for as much of this kind of activity as in the past.

My own first-hand knowledge is limited to a rather short experience of Toynbee Hall, where I am Chairman of the Governing Body. If you go down there you will be amazed at the range of activities and the freshness of outlook of those who are directing affairs, and at the real success which is achieved in bringing together men and women of very varied experience, upbringing and cultural development, in such a way as to establish a real community of interest which completely overrides differences of social or economic status. I think, therefore, that Major Ellis has rendered a real service in bringing together in his paper this afternoon the general outlines of the work which the settlements have been doing, are endeavouring to do, and are succeeding in doing. I think that all of us who have been privileged to listen to him to-day will take away a much clearer impression, of what this movement stands for and what it means in the life of our community, than can be gathered from reading such literature as is available on the subject. With those few desultory observations, I would invite you to make any contribution that you may feel moved to offer on this topic.

Mr. JOHN SPENCER: I think it would be interesting if Major Ellis would speak on what appears to be a very important trend in the character of some settlements to-day, namely, the transition from the settlement in which the residents, head and officers play a very important part in the organisation of the clubs connected with it, towards one in which there is much more action by the members themselves on the lines of a community centre.

Major LIONEL ELLIS: So far as I know, very little change has taken place which I regard as being at all of a radical character. It is true that in a great many of the areas now there are often in the settlement clubs people who, because they are much better educated than they were and because they are more developed socially, can take a much larger part in the government of affairs. But that makes no change in the function of the settlement, which was to bring people together to work in co-operation with their neighbours. If their neighbours can take a larger share, that is all to the good, but it does not fundamentally alter anything about the settlement.

Mr. WILFRID J. ROWLAND: I am sure that I am speaking for those present when I say how greatly we have appreciated the lecture to which we have just listened. It is a contribution towards a history which ought to be written, showing what the social influence

of the settlement movement has been in the past sixty or seventy years. I think that if one considered all the social legislation carried out in those years, one could almost invariably trace that legislation back to individuals, a very large proportion of whom were connected with work done at one or other of the settlements. I am thinking, for example, of the question of unemployment. The settlement with which I was connected about fifty years ago was Mansfield House in Canning Town, and the Women's Settlement connected with it. The work done by Will Reason and Percy Alden in the early days did a great deal to call attention to the whole problem of unemployment, which was, perhaps, more acute in the dock area than anywhere else. I well recall the occasion when Sir William Beveridge came to Mansfield House, making investigations into unemployment, and how we sat at the common room table to meet him. There was a man who was secretary of one of the dockers' unions there, a man reduced to such poverty on one occasion that he had to sell the history books he had bought to get bread. That contact, made by the social investigator with one, who knew what grinding poverty was and who had personally experienced the meaning of unemployment, was of tremendous benefit.

Then I can think of another case at Browning Hall, where two or three men gave themselves for a number of years to promoting the movement for old age pensions. They were definite pioneers, and Herbert Stead was one of them. The organisation which became known as the Poor Man's Lawyer was started at Mansfield House and spread to many parts of the country until the whole question of the way in which poor people could be helped to secure justice was placed on a better footing.

Mr. J. V. ALEXANDOR: I should like to ask what kind of work the residents do now, because in the past I imagine that they would have worked in boys' and girls' clubs and in play centres, whereas to-day full-time leaders for these activities are now provided through the Ministry of Education, the L.C.C. or the local authorities.

Major LIONEL ELLIS: I am afraid I am singularly ill-placed to answer this question because Toynbee Hall was bombed during the war and had to give up having residents. We let some of our rooms which were undamaged to probation officers and we are hoping to get those back and we shall then again be able to have residents. However, I cannot tell you what they will do. It will be different from the past. If you live in a place like Stepney as it is to-day and know the people and how they live, you cannot imagine any group of fifteen or twenty men not finding things to do.

Mr. G. MITCHELL: May I press the point about the present function of the settlement? As far as Toynbee Hall is concerned, people came from university circles to settle in the East End and there they ran the show, so to speak. It was a movement *de haut en bas*. Nowadays, our idea is a different one and it lays stress on the running of these things by the people who use them—clubs, societies, and so on. The community idea is based on the desires and the needs of the people who live in a specific locality.

Since the time of the establishment of Toynbee Hall, the evening institutes, run by the local authority, have appeared, and residential settlements continue at present with the help of grant aid from local education authorities. Therefore, I think the settlements have to show that they are providing something which is different from what evening institutes provide. I believe that they can produce something else, but I should like to press Major Ellis a little further on this point. I think the settlements must show that they are not behind the times.

Major LIONEL ELLIS: I am an unrepentant believer in the advantage, in a district like Stepney, of getting people to come to live there and meet the people, and thus themselves become part of the local community. It is not a question of "from above". It is simply one of widening the make-up of the local community and I know no way of doing that except through settlements. I still want to bring in people with a different experience and a wider outlook to live with the people and to take part in planning and developing

the community life. If you are suggesting that the settlement wants to "boss" things, I do not think that that is so, but if the settlement is financially responsible it must, up to a point, control. It can give the widest possible measure of freedom to the planning of activities with that inevitable limitation. I still do not think there is to-day any *essential* difference in the position of settlements. For in the districts where they are found there is still a great advantage in bringing in people with different experience and wider education.

Miss M. F. EVERY: I should like to ask Major Ellis if he would say a little more from the opposite point of view. With the settlement idea there is a movement in two directions. There is the movement from outside into a small community, but equally important is the contribution which comes from the people who have lived in the community and then gone out into the outer world. At St. Hilda's East, Bethnal Green, we have several students and when they go out into the world they act as interpreters of the art of trying to live together.

Major LIONEL ELLIS: I do not know what I can add to what I have already said. I think that the whole chance that we have of being of any use to each other clearly depends upon how well we know each other. People cannot know all their neighbours really well, but at least they know them better than if they lived far away. So far as students are concerned, even if they only stay for a month or two they will know their neighbours better to that extent, and it will be something. I think it is a very important thing that all these people who are going into administrative work should get all the knowledge they can of the people, and their chance of doing that is greater if they live in the place itself. It is easy to know each other superficially but difficult to know each other really well. It is not open to all of us to settle in a neighbourhood once and for all, though I know of several women and a few men who have gone to a settlement and afterwards have remained in the neighbourhood for the rest of their lives. I know of one woman in particular who must have been there sixty years. The true knowledge, which you may get from residence, is the kind that counts in these days as in the past. The people who stay long enough to know the neighbourhood really well are the people who do the most. Residence in a settlement even for a matter of weeks is a great help to people who are afterwards to take part in some form of social administration or public life, but best of all is the contribution that can be made by people who stay longer or even for life.

Miss JANE B. CAMPBELL: There is one relationship which has not been touched upon. A great deal has been said about the residents and the neighbourhood, but no one has dealt with the relationship between the two and the parent body. In the case of Toynbee Hall, the parent body is, presumably, Oxford University. In my own settlement the parent body is a girls' school and it seems to me that it is that relationship which it is difficult to maintain, although upon it, to an extent, depends the value of the settlement.

Major LIONEL ELLIS: I think that is a question which depends entirely on the particular relationship of the particular settlement. Toynbee Hall has had a close personal relationship with people at Oxford, but at the same time we have never drawn any considerable finances from Oxford. Some other settlements live largely on the financial contribution of a college or school, so that conditions must vary enormously. The only generality which can be stated is that the relationship depends upon personal contacts.

THE CHAIRMAN: I think we have now nearly exhausted the possibilities of this discussion. I am sure that it will be the wish of all of you to accord a very hearty vote of thanks to Major Ellis for his lecture this afternoon.

The vote of thanks was carried with acclamation, and after a vote of thanks had been accorded the Chairman with acclamation, the meeting terminated.

DR. MANN JUVENILE LECTURES

(I) HOW WE GET OUR COAL

By F. J. NORTH, D.Sc., F.G.S., F.S.A.

*Keeper of Geology, National Museum of Wales**Delivered Wednesday, December 31st, 1947*

It is often possible with the naked eye to see that coal is made up of layers, some of them bright, some of them dull, and some of them so soft as to soil the fingers as black as if they had been smeared with soot. In the bright layers we can sometimes recognise flattened fragments of the stems of plants, whilst the very soft black layers look as if they were made up of flattened fragments of charcoal or carbonised wood. When specially treated polished surfaces of coal or slices of coal, cut thinly enough to transmit a certain amount of light, are examined with the aid of the microscope, the more detailed examination that is then possible shows that the substance is made up almost entirely of the debris of plants in various stages of disintegration and decomposition.

From this we are entitled to assume that coal began in forests in long-past ages, and a consideration of the regions where coal seams now occur shows that whilst the coal-forests, as we may call them, existed in many areas and at many periods in the history of the earth, they were most widely spread and continued for a longer time during what geologists call the Carboniferous (or coal-bearing) period, which began about 240,000,000 years ago, and continued for about 30,000,000 years.

Fragments of plants that we can recognise in the coal itself, together with the fossil plants—impressions of leaves, stems, fruits and the like—that are to be found in the rocks that are associated with coal seams, enable us to reconstruct in imagination the successive stages in the formation of coal seam. Each one began in a forest extending over a wide area and lying sufficiently near to sea level for the dead and decaying vegetation to remain more or less waterlogged as generation after generation of trees grew upon the rotting remains of their ancestors.

From time to time large areas began to subside, the forests were “drowned”, and the surviving trees were killed off. Their remains, together with those of the remaining trees that had lived whilst the forest thrived, were buried beneath layers of mud or sand, brought down as sediment by the surrounding rivers and spread out on the floors of the newly-formed water-basins. The mud and sand gave rise to the rocks that separate one coal seam from another, for in a typical coal field there may be many coal seams, varying from a few inches to several feet in thickness, separated from one another by beds of rock—usually relatively soft *shale* in layers like cardboard but sometimes hard *sandstone*.

This series of processes, the accumulation of extensive and thick layers of decomposing vegetable debris on the sites of swampy forests, and the hermetical sealing of the debris when subsidence caused the site to be occupied by water from which mud and sand were deposited, was repeated time and time again. As a result, many thousands of feet of coal measures (as the rocks associated with coal seams are called) were laid down. Each layer of vegetable debris, the product of centuries

of forest growth, subsequently gave rise to a seam of coal, but when the coal-forest period came to an end, the first coal seams to be formed were very deeply buried and even the most recently formed ones were overspread with rock and would have been invisible to a human observer, had there been one at the time.

The exposure of coal seams sufficiently near to the surface to make it practicable to dig mines to reach them is the result of movements in the earth's crust, which caused the more or less flat layers of coal-bearing rock to be thrown into great arch-like and trough-like folds. As the "arches" were being uplifted, their tops were worn away as a result of exposure to rain, wind, and frost, and in many regions the coal-bearing strata were completely removed from such areas, leaving those which remained in the basins or trough-like folds to be preserved and, after other movement and deformation, to become the coalfields of to-day.

The earliest coal workings were small shallow excavations where seams actually appeared at the surface and it is interesting to note that in recent years the great demand for coal has led to a return to *opencast mining*, as coal digging at the surface is called. Nowadays the coal is not obtained from small holes dug by hand, but great trenches are excavated by powerful machines, that lift or scrape away the rock that rests upon a coal seam and expose the coal which can be removed and loaded into lorries.

Whether on a small scale as in the old days, or on a large scale as now, opencast mining is only possible where the seams lie comparatively near to the surface and are not very steeply inclined, but the basin-like structure of a typical coalfield carries the seams more and more deeply beneath the surface until in the deepest parts of the basins the seams may be covered by several thousands of feet of rock.

The history of coal mining is a record of triumphs over the dangers and difficulties of bringing the coal from deep pits, and from working-places that (in mines worked according to a plan commonly adopted in this country) move farther and farther away from the pit bottom as the mine grows older. After a few years of working the miner may have to travel a considerable distance underground—a mile or more from the bottom of the shaft by means of which he has descended from the surface—before he reaches the place where he will begin work, so that mining involves not only the digging and hauling of coal, but the maintenance of underground roads giving access to the working-places and along which coal may be brought to the shaft and thence to the surface.

The "roof" left when the coal has been removed has to be supported by wooden or steel posts (pit-props) until it is safe and convenient to allow it to subside and close up that part of the space left by the removal of the coal which has not been filled with the fragments of rock dislodged during the mining process. Fresh air has to be pumped to all parts of the mine, not only to enable the miners to breathe, but also to sweep away the explosive gas (methane) that is given off from the coal in many mines. If this were not done, explosions would be more frequent than they are and work in many mines would become impossible.

Working as they do in total darkness miners need light. At one time candles or oil lamps were used, but their flames so often ignited the gas, giving rise to fires and explosions that early miners were compelled to seek for a light that would not ignite gas. A hand-driven machine, by means of which a steel disc was made to rotate rapidly against a piece of flint, thus producing a stream of sparks, was tried,

but it was soon abandoned because the light was poor and not as safe as it was hoped it would be. Decaying fish was tried because of the phosphorescent light it emitted, but the lighting difficulty was finally overcome in the early part of the nineteenth century, when Dr. Clanny, George Stephenson, and (Sir) Humphrey Davy, working independently, produced lamps that would burn and give light in air containing explosive proportions of methane, and yet not ignite the gas.

In Davy's lamp, which is the real ancestor of the modern miners' safety lamps, the flame was enclosed within a cylinder of wire gauze; air could reach the flame and light could be emitted, but the gauze conducted away the heat of the flame so quickly that the explosive mixture outside the lamp was not ignited. In modern safety lamps the gauze is partly replaced by glass to provide better illumination, and the remainder is surrounded by a steel jacket to prevent it from being damaged due to a fall or to contact with a flying splinter of rock. Electric lamps are extensively used nowadays, but the "safety lamp" is still necessary, because, apart from the light it emits, it shows the miner when gas is present and enables him to determine when the amount is becoming dangerous. In the presence of explosive mine-gas a blue cap appears over the usually yellow flame and grows taller as the amount of gas increases.

In the old days all mining operations were done by hand—the coal was excavated by miners using picks and it was hauled to the bottom of the shaft on sledges (later in small wheeled vehicles), pulled or pushed by women or boys. In some mines it was even left to the women to carry it up ladders attached to the side of the shaft in order to bring it to the surface. At an early date machinery was used to wind the cages up and down the shafts, whilst horses, endless ropes driven by revolving drums, and ropes hauled by compressed air machines were introduced to haul the coal underground.

The nature and rate of the introduction of mechanical methods has varied from coalfield to coalfield and from mine to mine according to a variety of conditions, but the present tendency is to use machinery for more and more of the processes. Machines are now available to cut the coal at the face, to load the fallen coal on to travelling belts or into cars hauled by locomotives by which it is eventually brought to the pit bottom. Where such machines can be introduced, they will do away with hand digging and cutting, and will relieve men of the arduous work of shovelling coal into the trucks or on to the belts. They will also do away with the necessity for boring holes into the coal so that explosives can be fired to dislodge it and break it into pieces that men can handle or shovel up.

It will be some time before such machines can be universally used—indeed, there are pits where some of them may never be used because natural conditions do not permit. But by replanning some mines and opening others designed along new lines, and, as a result of the research that is being undertaken to lessen the risks of injury and disease amongst mine workers, coal mining will lose many of the characteristics that have made it so arduous, unpleasant, and dangerous, and will instead become a highly mechanised industry calling for a technical knowledge and ability of new kinds. The work will always be hard, and in varying degrees unpleasant, but it will be divested of much of the drudgery and of most of the dangers that have characterised it in the past.

Mechanisation in mining is usually associated with American practice, but that is largely because machines were easier to introduce when new mines were being opened up than in old ones that had been planned in the days when machinery was not available. Some of the most efficient machines which cut the coal without the use of explosives and automatically load it on to conveyors are British inventions.

With the realisation of what has to be done and the determination to do it, there is no reason why our coal mining industry should not play as important a part in the future of the country as it has in the past. Britain showed the world how to use coal, and for a very long time supplied the greater part of the world's needs. Even as recently as 1890 Britain produced about half of the world's output.



Dr. North demonstrating his apparatus to the audience

(II) WHAT WE DO WITH OUR COAL

By W. IDRIS JONES, B.Sc., PH.D.

Director-General of Research, National Coal Board

Delivered Wednesday, January 7th, 1948

Coal has been known from very early times. It is referred to in China three centuries before the time of Christ, and there is evidence of its use during the Roman occupation of Britain, as we have found coal cinders mixed with Roman coins at Newcastle-on-Tyne. In 1217, the Forest Charter was granted by Henry III giving certain Lords of the Manor the right to dig for minerals, and coal-mining seems to have been carried out in Wales, the Midlands, the North and Scotland in the thirteenth century.

In Chaucer's time coal was brought from Tyneside and became the common fuel in London. Later, under Queen Elizabeth, it was substituted for charcoal for smelting certain minerals. Gradually its use developed and coal-mining became more similar to that of modern times. At the beginning of the eighteenth century coal was successfully used for smelting iron and following this development the coalfields

expanded rapidly. Newcomen's Atmospheric Engine in 1705, James Watt's steam engine in 1765, and Trevithick's locomotive in 1804 made it possible to hoist and transport much greater quantities of coal and set the Industrial Revolution of Britain into its stride. In 1600 the annual coal output was about 250,000 tons, in 1700 it was 3,000,000, and in 1800 it had jumped to 10,000,000. Now, of course, it is about 200,000,000.

When coal arrives at the surface of a pit in tubs or trams, it is a mixture of various sizes and is contaminated with impurities such as shale, rock, fireclay, and so on. The larger coal is separated by screening and is then passed over picking belts where the stone and shale are picked away by hand. The smaller coal is sorted in a variety of ways—usually by floating the dirty coal in a pulsating current of water or in a mixture of water and sand.

There are many different kinds of coal ranging from peat to anthracite, and including the various bituminous coals. One might say that peat is a very soft and young coal, whereas anthracite is very hard and old.

There are three main uses for coal; as a source of heat and power; as a raw material for certain manufacturing processes; and as a source of gas and a host of other valuable chemical products.

Now the energy of the sun is preserved in coal substance. One pound of coal contains enough energy to lift a ton weight to the summit of Snowdon. To release this energy we can, of course, burn the coal. About 70,000,000 tons of coal are used in this way to raise steam each year, and 60,000,000 tons to heat and light our homes, either by using the coal directly or in the production of the coke, electricity or gas, produced from it.

Coal is also an essential material in a wide range of manufacturing processes. It contains carbon and we require this carbon not only for the production of iron and steel out of iron ore and thus in the manufacture of motor cars, bicycles and so on, but also for many chemicals such as washing soda and lime for whitewashing or cement.

Then there are a host of valuable chemical products which come from coal. When we burn coal we waste the smoke and the ash. Now if we extract gas from coal in gas works and coke ovens we get left behind some tar, a liquid looking rather like dirty water and having a smell of ammonia, and a solid coke residue. Now the gas and the coke between them can be used to light and heat our homes and from the tar and the other residues we can get many valuable chemicals. From the gas we can also, besides many other products, get benzole to add to petrol for driving cars, and we can get hydrogen sulphide and hence sulphuric acid, from which we make sulphate of ammonia, used as a fertiliser and in the purification of drinking water. The coke also is of the greatest importance in the production of iron and steel.

From the dirty water we get ammonia, which we can also get from the coke ovens. It is a wonderfully valuable chemical, being used as a refrigerant, and being convertible into fertilisers and into high explosives. From the tar we, of course, get the material, with which we make our roads, in many different grades, suitable for heavy or light traffic and for hot or cold climates, but we can also get much more. We can get pitch for briquetting coal or for roofing, and we can also get creosote for the protection of railway sleepers and telegraph poles from the deteriorating

action of the weather. In the last century Perkin, a very great English chemist, produced from this tar a dyestuff called mauve; and this discovery was the open sesame to a host of similar developments, until by to-day very many valuable products are produced from coal tar; motor fuel, plastics of many kinds, synthetic rubber, dyestuffs, pharmaceutical products such as M. and B. for pneumonia, Vitamin K₁ substitute for stopping hæmorrhage, aspirin for headaches, antiseptics, anæsthetics, flavourings and essences, perfumes, explosives, plant growth promoters, soil fumigants, and so on.

Further, I would like to mention that coal has been converted into oil, and coal gas can be used for producing chemicals such as formaldehyde, which is most valuable to-day in making plastics and high explosives or as an antiseptic. We can also, by heating together to a very high temperature coal, coke and limestone, produce calcium carbide, from which we get various chemicals such as plastics, artificial silk, acetone, essences, and many more. Coal is also used in the making of hydrogen, which was used to fill barrage balloons during the war, or, more recently, to convert fish oils and vegetable oils into margarine.

It is possible to go on cataloguing the many uses of coal for a very long time and it is difficult to know where to stop. It is veritably one of the most precious diamonds in the British Crown. I have no doubt that its use will continue to increase more and more during the years that lie ahead. Why, even in the field of atomic energy, pure carbon for the piles, which form an integral part of the atomic plant, can be made from coal tar pitch!

CORRESPONDENCE

CRAFTSMANSHIP

The Royal Society of Arts has done well to sponsor the talks of Mr. John Farleigh and Mr. Bernard Leach, both remarkable for their spiritual content, both presenting the craftsman as a channel for Life. Though the Society's field of study includes the arts, its method is the scientific method, and it may unwittingly have contributed in the past to the dangerous idea that a designer is a special sort of expert who can put a beautiful shape on anything, and can be called in to design everything from a teapot to a wireless set.

Now design is synonymous with craftsmanship. Design must come from within. He who essays to create designs without a long apprenticeship to the craft and an intimate acquaintance with the materials and techniques is not only a failure in himself. He is a saboteur. He is spreading the impression that design is merely a trick, a fashionable stunt, and is helping to alienate the public. I have even found a designer for industry, with only a superficial knowledge of his subject matter, attempting to design a trailer caravan, a thing as highly functional as an aeroplane or a ship, in which beauty can be achieved only by a mastery of a hundred practical points of space saving, weight distribution, living convenience, and so on.

Even a giant like William Morris could not master all the crafts he attempted, for some of them he had to re-discover for himself, and so his great contribution was as a prophet and pioneer. His actual work lacks the timelessness and the vitality closely related to utility of which Mr. Farleigh speaks. Turning to another example, I recall that Eric Gill, writing from a confident mastery of at least two crafts, sculpture and typography, declared that for sheer efficiency, measured by the complete achievement of his purpose with the maximum economy of effort and material, the artist could leave the so-called practical man hopelessly behind.

W. M. WHITEMAN.

DEATH OF TWO ALBERT MEDALLISTS

THE EARL OF DERBY AND MR. ORVILLE WRIGHT

England, and especially Lancashire, has suffered a grievous loss by the death of one of her greatest sons, the seventeenth Earl of Derby. No man ever lived a finer or fuller life than he, and there is no one in any sphere who will not sorely miss his genial presence and overflowing kindness. His greatest joy was helping others and his great influence was ever used for this purpose and was never sought in vain.

In 1936 Lord Derby was, by unanimous vote, awarded the Albert Medal "for the advancement of Commerce and Arts, especially in Lancashire", an honour which gave him the keenest satisfaction.

On the occasion of the presentation of the medal by the Duke of Connaught the recipient said :

"Your Royal Highness has been good enough to refer to my work in Lancashire. I think you know me well enough, Sir, to realise that anything I can do in that County is a labour of love and not only a duty that I feel I owe to those amongst whom I live. This is a time when everybody who can do anything ought to do something for his neighbours and, if I may say so, there is always work at hand that can be done".

Those words were typical of that great man.

When the distinction of Royal Designer for Industry was instituted by the Society and the Duke of Gloucester presented the first Diplomas at the Society's house, Lord Derby came over specially from the Continent to propose the vote of thanks.

In 1941 Lord Derby became a Fellow of the Society in which, as in everything else he was associated with, he took a constant interest.

His outstanding popularity with all sorts and conditions of men never waned to the end. Men of his type are fast disappearing and his death is in every sense a bitter loss to the country he loved so well.

J.A.M.

We regret also to announce the death at Dayton, Ohio, of Mr. Orville Wright, an Albert Medallist of the Society, who with his brother, the late Mr. Wilbur Wright, made the first flights from the earth in a mechanically-propelled aircraft. Between them they mastered the design and control of the glider, carrying on the work of Lilienthal and Pilcher, which had been cut short by their deaths. They equipped their machine with a 12 h.p. engine, which they had themselves designed, and on December 17th, 1903, Orville successfully managed to fly the machine in the air for twelve seconds and over a distance of 120 feet; later the same day Wilbur flew for 852 feet and 59 seconds.

Orville and Wilbur, from these humble beginnings, built up a successful aircraft business at their native Dayton. Wilbur died when he was only 45, but Orville lived on at Dayton to see the development of flying over the whole world. He was 76.

On October 27th, 1917, at a ceremony held at the Memorial Hall at Dayton, Lord Northcliffe, a Vice-President of the Society and Chairman of the British War Mission to the United States of America, handed to Orville Wright the Society's Albert Medal "in recognition of the value of the contributions of Wilbur and Orville Wright to the solution of the problem of mechanical flight".

GENERAL NOTE

THE ART OF MARC CHAGALL.—Marc Chagall, whose works remain on view at the Tate Gallery until the end of the month has acquired an international reputation as one of the leading members of the cosmopolitan School of Paris. Born sixty-one years ago in a Jewish community near the Russian village of Vitebsk, he began to receive serious attention as an exhibitor at the *Salon des Indépendants* during the years immediately before the first world war. In the 'twenties much of his time was occupied in etching plates for books commissioned by Ambroise Vollard (these are included in his exhibition at the Tate), and in the following decade he travelled widely in Europe and the Middle East, exhibiting his work in London, Basle and other centres. In 1941 he left France for New York and found refuge in the United States during the following years. The present exhibition, which Chagall has supervised himself, is, I believe, the first post-war retrospective show of his work he has held.

Now in order to appraise subjective painting, the art critic is obliged to assume the functions of a psychologist; and, in fact, contemporary art criticism is concerned quite as much with an artist's motives as with his achievement. Since the only worth-while clues the critic has to aid him in attempting to interpret the dream fantasies of such painters as Chagall are the few hints (usually in a foreign language) that the artists may choose to drop, it follows that the critics are usually at variance in their interpretations—and the ordinary reader, who has more pressing problems of his own, shrugs his shoulders and turns the page. Though I appear to be almost the only professional critic (I have, I think, the support of *Apollo's* gifted writer) who deplores the kind of pictorial photo-montage which induces almost every emotion except an æsthetic one, I have always held that a serious artist deserves to be seriously considered, and that Marc Chagall is a painter who cannot be ignored there is no question at all.

No unprejudiced observer would deny the intensity of his colour, and the splendour of his colour harmonies in such pictures as "The Town" which (since his vision is seldom objective) might more aptly be given the Whistlerian titles of Symphonies in this or that colour. Certainly few students of modern art would ignore such brilliant paintings as "The Praying Jew", a decorative portrait of the first order, and "The Blue House", akin in feeling to a Van Gogh of the Paris period.

But how far can we follow Chagall into his "dream country" where, in Mr. Wilenski's words, "it is simpler to ride on a farmyard fowl than to board an omnibus, where angels drink tea inside bouquets of roses, where blue cows fly over pink moons and lovers walk literally on air, and where anyone, who has a heart, can live as pleasantly without a head as with one"? You may enjoy the spectacle of a painter kicking over the traces. You may consider, with Mr. Earp, that such transformations of reality are no more to be criticised than the worlds of Carroll and Lear. You may even agree with the opinion I have stated elsewhere that these are the products of the feverish imagination of an artist, whose outlook has been coloured by the tragedy of his times, and whose mind has constantly returned for comfort to the half-remembered scenes of his native village.

But supposing that this diagnosis were correct, does it necessarily follow that because we can dimly appreciate an artist's state of mind and therefore the nature of his æsthetic impulses, we automatically experience æsthetic emotions before his pictures? Fully to realise, say the French wisely, is freely to forgive. But fully to understand, if that were possible, the mind that conceived "The Obsession"—is that fully to enjoy the product as a work of art? Let the reader visit the exhibition and judge for himself.

N. A. D. WALLIS.

NOTES ON BOOKS

FOREST SOILS AND FOREST GROWTH. By S. A. Wilde. *Chronica Botanica*, U.S.A.; Wm. Dawson and Sons, Ltd., London. 1946. \$18.

This beautifully-got-up book by S. A. Wilde of the University of Wisconsin, forms one of a new series of Plant Science Books, edited by Frans Verdoorn and published by the *Chronica Botanica* Company (Waltham, Mass., U.S.A.). The plan of the

book would appear to be based on the belief held by the author of the relations existing between the soil, the tree and its shape, and a mass of trees growing under correct forestry management. He quotes the words of Lin Yutang, that the outline of every tree "expresses a rhythm resulting from certain organic impulses; the impulse to grow and reach out toward the sunshine, the impulse to maintain its equilibrium, and the necessity of resisting the movement of the wind . . . The result is something perfectly harmonious and immensely satisfying". Mr. Wilde continues: "The same law of organic impulses is indeed applicable to every aggregate of trees and shrubs, and other forms of life that are collectively called—forest. At the base of this natural co-ordination and harmony rests the soil, the medium that supports and nourishes different members of the forest community. The soil directly influences the composition of forest stands, their morphological pattern, rate of growth, quality of wood, reproductive vigour, degree of resistance to diseases, stability against the wind and other important aspects. An understanding of the forest lies just as much below as above the ground line".

Some of these are dangerous generalities, or half truths. For instance, if a forest crop is to be brought to timber size and produce an estimated volume per acre in a definite period of years, neither the best nor the poorest soils will ensure the objects aimed at, unless a correct and systematic system of periodical thinnings has been carried out throughout the life of the crop. The methods upon which this is carried out, and the success achieved, depend upon the ability of the forester-in-charge, although admittedly the quality of the soil present will necessitate a variation in the strength of the periodical thinnings made. For a long time past the trained forester has been fully aware of the importance of the soils upon which his forests have to be grown; though it may be admitted that modern research work in connection with the soils of the forest is perhaps to a considerable extent a product of the present century. The soil research worker when he is concerning himself with such a long term business as forestry, so radically different to the short rotations of agriculture, has to be careful. To be of any practical value his work must be of use to the district forest officer, the man actually in charge of the forest area in question—responsible for the arrangement of the fellings of the old crop, the regeneration of the new one, and the long-termed thinnings during the greater part of the life of the forest. The author writes: "Unfortunately, many silvicultural conclusions have been drawn with little knowledge of the underlying soil; a good share of pedological observations has been made with no consideration of the botanical composition or productivity of the native vegetation"—a somewhat drastic criticism. Every forester knows that his soils are made up of more (or less) than "a mixture of sand, clay, lime and humus". Great forests of oak and beech in mixture are to be studied in France, managed with a high skill and knowledge of the silvicultural characteristics and requirements of the species on a rotation of 180 years and above. In the case of one of the largest of these the soil on the agricultural land outside the forest is thin and of poor quality—that inside built up by the trees through centuries is rich and deep—a true forest soil built up and maintained by the forest, and latterly by three centuries of good management by the forester. And the primeval sub-tropical and tropical forests show similar aspects in their soils and conditions which rapidly deteriorate, under man's activities of fire, excessive grazing of stock and indiscriminate hacking, to what may become desert conditions. Where the soil research officer is practically assisting the forest officer in his silvicultural work is the direction alluded to by Wilde; "I have aimed to interpret forest soils as carriers of definite floristic associations, as media for the growth of nursery stock or forest plantations, and as dynamic systems that reach to different forms of silvicultural cutting".

Wilde considers his subject under the headings—Historical and Introductory; Genesis of Forest Soils; Genetic Soil Groups of the World; Upland Soils and Hydro-morphic and Embryonic Soils; Forest Cover; its Biological Structure and its relation to Environment; Physical and Chemical Properties of Forest Soils; Organisms of Forest Soils; Forest Humus; Soil—Forest Types; Forest Soil Survey; Soils and Tree Planting;

Amelioration of Forest Soils; Sylvicultural Cuttings in relation to Soils; Productivity of Forest Soil and Forest Management; Forest Nurseries and generally methods of managing them and controlling parasitic pests.

In some parts of this book the author would appear to go beyond the borders of his subject. For instance, under "Soils and Tree Planting" he states: "In the majority of cases the selection of trees to be planted is confined to native species, the seed or cuttings of which are collected in the same region". The greater bulk of the afforestation work carried out by the Forestry Commission in Britain during the past quarter of a century has been done with exotic conifers. In many parts of the British Empire, Dominions and Colonies alike, considerable areas of plantations have been made with exotics. In New Zealand during the last thirty years enormous areas have been afforested with coniferous exotics both by Government and private companies. The chapter on "Sylvicultural Cuttings in relation to Soils" could have been omitted with advantage. It principally consists of quotations from the works of well-known foresters written from a forest point of view of the relation of the forests to the soil, based upon their sylvicultural experiences of the forest soils, which are well known to all foresters. The same remark applies to the chapter on "Productivity of Forest Soil and Forest Management", a purely technical matter for the highly-trained forester, and one capable indeed of several interpretations.

The author's treatment of the forest nursery and all that pertains to its upkeep is a most valuable contribution to this increasingly important phase of forest work. Methods of establishing a nursery, watering and so forth are on orthodox lines. The author's discussion on the use of commercial fertilizers and lime, use of composts, liquid fertilizers and green manure crops merits careful attention, as does the concluding chapter on "Adjustment of Nursery Soil Fertility and the Control of Parasitic Organisms in Soils of Forest Nurseries".

E. P. STEBBING.

TREES FOR TOWN AND COUNTRY. Lund Humphries. 1947. 25s.

"Trees for Town and Country", prepared by Miss Brenda Colvin for the Association for Planning and Regional Reconstruction and published by Lund Humphries, though primarily written as a reference book for Town and Country Planners will interest the ordinary reader who wants to know more about some of the trees to be found in this country.

The full-page photographs of really fine specimens are excellent and the diagrammatic drawings to scale, by S. R. Badmin, are most helpful, giving the height, spread, form and rate of growth, also details of leaf and flower. It would be useful to have photographs of the particular trees illustrated in their winter aspect as well as the diagrams.

The cultural details and other particulars given on each page are adequate but reference to the longevity of each kind might have been made. General advice will also be found in the introduction. The important point as to lopping and trimming has been dealt with where this is likely to be needed, and it is essential that this is done with due care as to the future appearance of the tree, for there are far too many mutilated specimens to be seen in our streets.

The book does not claim to be an exhaustive list but it is rather a pity it is confined mainly to the largest growing kinds. Perhaps it is intended to produce a further volume, as it has meant the exclusion of some beautiful smaller trees such as the "Cornelian Cherry" (*Cornus Mas*), "Persian Iron Wood" (*Parrotia persica*), both winter flowering, and "Sweet Gum" (*Liquidamber styraciflua*), all of which have particularly good autumn colouring. Other things which have been left out are the Fig and Mulberry both excellent town trees. A surprising omission is Magnolia, one of the loveliest of our spring flowering trees and one which will thrive in quite close conditions.

There are useful lists of trees for various purposes at the end of the book, but one giving a list of those specially suitable for London would have been a helpful addition.

It should be remembered when planting Beech and Yew for mass effect that eventually, owing to the dense canopy they make, nothing will grow underneath.

The book is a fine production and one that should serve a very useful purpose.

CHARLES HOLDEN.

PICTURES IN THE IRISH NATIONAL GALLERY. By Thomas MacGreery. Batsford. 1946. 12s. 6d.

Since its foundation just over eighty years ago the Irish National Gallery has acquired a collection of pictures, representative of the various European schools of painting, of which any of the minor capitals of Europe would be proud; and Mr. MacGreery, the distinguished Irish art critic, has performed a useful service in introducing us to thirty-four of the choicest works in the collection, which are reproduced in monochrome with accompanying notes.

When it is stated that the Irish school is represented only by James Barry, J. A. O'Connor, Walter Osborne and J. B. Yeats, the remaining pictures being examples of English, French, Italian, Dutch, Flemish, Spanish and German schools of different periods, it will be seen that the author has been principally concerned to demonstrate the richly representative character of the Gallery's acquisitions. One could wish that there had been a larger proportion of Irish paintings; but perhaps Mr. MacGreery will consider devoting another book to the works of a national school which, it must be admitted, owing to unsettled conditions, never properly took root and flourished before the advent of the Young Ireland movement less than a century ago. In our life-time and practising in our midst, we have had a genius in that sprightly little Dubliner, Sir William Orpen, and a painter of quite remarkable dexterity in Sir John Lavery of Belfast and—though space has not been found for them in this survey—it is hard to believe that they are unrepresented in the principal gallery of their native land.

An account of the Irish pictures in the gallery would certainly be timely, but even more valuable would be a study of the development of Irish painting from, let us say, the seventeenth-century Garret Murphy to Orpen, and it is to be hoped that Mr. MacGreery will one day bring his gifts to this task. Meanwhile we must be grateful to him for being such a stimulating guide and allowing us, in an all too brief tour of the rooms, at least a glimpse of four notable Irish painters in *pas ing*.

Of these perhaps the most remarkable is James Barry (born in Cork in 1741), whose self-portrait, which reveals a youthful head and the eyes of a visionary, adorns the cover of the book. Barry aspired to be a great "historical" artist like Poussin, but it was his misfortune to live in an age which adulated society portraiture and had little time for his classical themes, and his career was consequently one of unrealised ambitions. A few works, whose distinctive qualities have now been generally recognised, have survived him however, among them the impressive series of wall paintings at the Royal Society of Arts, and the sensitive "Self-Portrait" and "Portrait of a Harper" in the Irish National Gallery.

J. B. Yeats, one of the few great Irish artists of modern times to discover in his country's life a never failing source of inspiration, is represented here by his fine portrait of John O'Leary, a patriarchal figure in the Dublin of half a century ago; J. A. O'Connor (1792-1841) by a moonlit Irish landscape—"The Poachers"—which has some affinities with the art of Van der Neer; and Walter Osborne (1859-1903) by an exquisite painting of "St. Patrick's Close", a characteristic Irish subject in which his genius found such eloquent expression.

Inadequate though our knowledge of Irish painting may be (Burlington House please take note), it is probable that we have more frequent opportunities of acquainting ourselves with the old masters than are afforded in John Bull's Other Island; and it must suffice to say of the choice examples of European art reproduced in the book that they have been discriminately chosen, and greatly enhance the value of this brief survey.

N. A. D. W.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, FEBRUARY 16. Eugenics Society, at Manson House, W.I. 5 p.m. W. Russell Brain, "Some Reflections on Genius."

TUESDAY, FEBRUARY 17. Chadwick Trust, at the Royal Society of Tropical Medicine and Hygiene, W.I. 2.30 p.m. Dr. René Sand, "How Medicine became Social."

Industrial Transport Association, at the Royal Society of Arts, W.C.2. 6.30 p.m. A. E. Earle, "Shipping," Textile Institute, at the College of Art and Technology, Leicester, 6.45 p.m. A. Johnson, "Some Commercial Applications of the Newer Textile Fabrics."

WEDNESDAY, FEBRUARY 18. Engineers-in-Charge, Institution of, at E.L.M.A., Savoy Hill, W.C.2. 6.30 p.m. W. R. Robinson, "The General Trend in Modern Lighting."

THURSDAY, FEBRUARY 19. Chemical Society, Burlington House, W.I. 7.30 p.m. Sir Edward Mellanby, "The Sir Frederick Gowland Hopkins Memorial Lecture."

Royal Society, W.I. 4.30 p.m. A. R. Clapham and H. Godwin, "Studies of the Post Glacial History of British Vegetation."

Textile Institute, at the Midland Hotel, Bradford, 7 p.m. C. A. Norris, "Some Aspects of Wetting and Scouring."

FRIDAY, FEBRUARY 20. Atomic Scientists Association, at the Royal Society of Arts, W.C.2. 7 p.m. Dr. F. C. Champion, "Elementary Atomic Theory."

Engineers, Junior Institution of, 30, Victoria Street, S.W.1. 6.30 p.m. W. E. W. Millington, "Ferranti and his Engine Designs."

Engineers, Society of, at 17 Victoria Street, S.W.1. 6.30 p.m. L. J. Merry, "Technical Education."

Engineers and Shipbuilders, N.E. Coast Institution of, at the Mining Institute, Newcastle-upon-Tyne, 6.15 p.m. (1) R. G. Manley, "The Analysis and Interpretation of Vibration Records and Similar Traces in Engineering." (2) F. H. Todd, "Ship Vibration."

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. J. R. Rylands and J. R. Jenkinson, "Corrosion of Heating Surfaces."

Royal Institution, W.I. 9 p.m. The Rev. C. E. Raven, "Some Neglected Aspects of the History of Science."

TUESDAY, FEBRUARY 24. Architects, Royal Institute of British, W.I. 6 p.m. M. Hartland Thomas, "The Influence of Technical Research on Design and Methods of Building."

East India Association, at Overseas House, S.W.1. 2.30 p.m. Dr. Harold Mann, "Village Betterment in the New India and Pakistan."

Refrigeration, Institute of, at the Institution of Mechanical Engineers, S.W.1. 5.30 p.m. G. W. Daniels, "Refrigeration in the Chemical Industry."

Textile Institute, 16 St. Mary's Parsonage, Manchester, 8.6.30 p.m. F. Shuttleworth, "Some Strange Native Customs and Ways of Using Textile Materials."

WEDNESDAY, FEBRUARY 25. Foundrymen, Institute of British, at the Waldorf Hotel, W.C.2. 7.30 p.m. Dr. A. B. Everest, "Specification and Testing of Cast Irons."

Kinematograph Society, British, at the G.B. Theatre Wardour Street, W.1. 7.15 p.m. John Flynn, "Design and Use of the Miniature in Motion Pictures."

Textile Institute, at the Memorial Hall, Macclesfield 8 p.m. Paul Whiston, "Design and Colour in Textiles."

THURSDAY, FEBRUARY 26. Dyers and Colourists, Society of, at the Great Northern Victoria Hotel, Bradford, 7.15 p.m. Dr. A. H. Gordon, "The Composition of Wool."

Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 6.30 p.m. E. G. Fitzcombe, "Factors Influencing the Selection of Road Transport Vehicles."

Royal Society, W.I. 4.30 p.m. Sir Wallace Akers, "The Research Laboratories of the Imperial Chemical Industries, Ltd."

Textile Institute, at the Technical College, Keighley 7 p.m. A. Glover, "Rayon Weaving."

FRIDAY, FEBRUARY 27. Electrical Engineers, Institution of, at the Central Hall, S.W.1. 6.30 p.m. P. Dunsheath, "Electricity and Everyman."

Engineers, Junior Institution of, 30 Victoria Street, S.W.1. 6.30 p.m. A. J. Simpson, "Automatic Washing Control in the Laundry Industry."

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. Dr. F. Rogers, "The Future of Fuel and Power."

Royal Institution, W.I. 9 p.m. Professor Linus C. Pauling, "The Nature of Forces between Large Molecules of Biological Interest."

Sound Recording Association, British, at the Royal Society of Arts, W.C.2. 7 p.m. P. T. Holborn, "Recent Developments in Magnetic Recording."

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John Dalton,

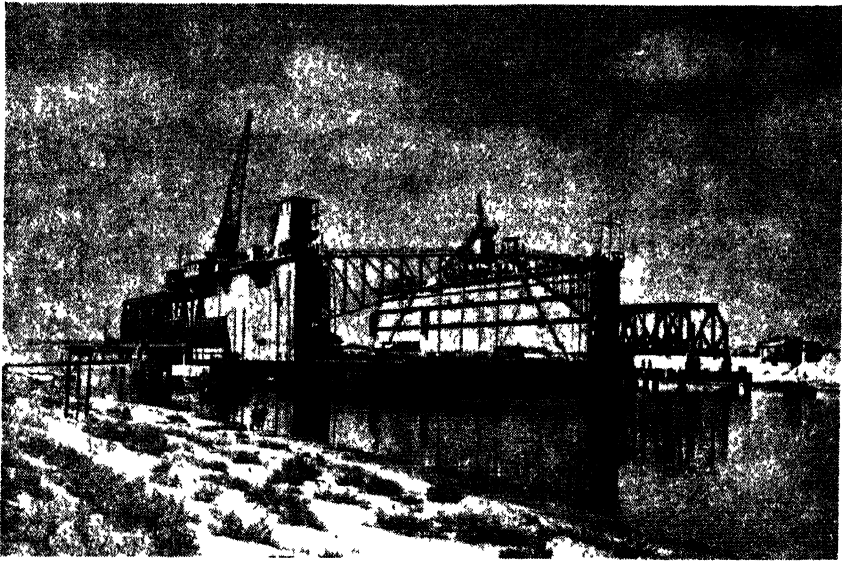
an English Quaker, was the first to propound the theory that the atom was the smallest particle of matter imaginable — a theory that was not assailed until more than a century later. Even in Dalton's day, the idea that matter was composed of small indivisible particles was not new. A similar theory had been

put forward by the Greek philosopher Democritus two thousand years earlier. Sir Isaac Newton had restated it as the "corpuscular theory" a hundred years before Dalton. Where Dalton excelled them was in formulating these theories in a way that explained known chemical processes, and enabled deductions to be made which could be submitted to the test of practical experiment. In short, he translated them from philosophical abstractions into a method for accurately forecasting and controlling chemical reactions and manufacturing processes.

Dalton, the son of a weaver, was born in 1766. He went to work at the age of 12, but studied in his spare time to such effect that in 1793 the Manchester Academy appointed him tutor in mathematics and natural science. Six years later he set himself up as a private teacher, devoting his leisure to research and the fashioning of his Atomic Theory, which was first published in 1808 in his book "A New System of Chemical Philosophy". Dalton's theory, unaltered in its essentials, is still used to explain the laws of chemical combination. Dalton's work was the basis of the knowledge which enabled British scientists to contribute so much to the startling developments of atomic disintegration.



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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4763

FRIDAY, FEBRUARY 27th, 1948

Vol. xcvi

MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

MONDAY, MARCH 1ST, at 4.30 p.m. (*First of three Cantor Lectures*).—"COLLOIDS", by Eric K. Rideal, M.B.E., D.Sc., F.R.S., Fullerian Professor of Chemistry, Royal Institution. The course will be illustrated by lantern slides and experiments. (See syllabus below.)

WEDNESDAY, MARCH 3RD, at 2.30 p.m.—"CRAFTSMANSHIP" (V).—"SMITHCRAFT", by J. Seymour Lindsay. H. S. Goodhart-Rendel, P.P.R.I.B.A., will preside. The paper will be illustrated by exhibits and lantern slides.

MONDAY, MARCH 8TH, at 4.30 p.m.—Second Cantor lecture by Professor E. K. Rideal.

WEDNESDAY, MARCH 10TH, at 2.30 p.m.—"THE TRADE AND TECHNICAL PRESS", by Roland E. Dangerfield, Managing Director, The Temple Press, Ltd. Sir Ernest Benn, BART., C.B.E., will preside.

SYLLABUS for three Cantor Lectures on Colloids by Professor E. K. Rideal.

Lecture I.—"VARIETY OF COLLOIDS". Phase systems involved. Suspensions. Preparation by aggregation or dispersion. Micellar systems and polymers or macromolecules. (Monday March 1st.)

Lecture II.—"THE STABILITY OF COLLOIDAL SYSTEMS". Solvation and swelling. The electrical properties. Rates of diffusion, electro cataphoresis and sedimentation in the Ultracentrifuge. (Monday, March 8th.)

Lecture III.—"THE SIZE AND SHAPE OF COLLOIDAL PARTICLES". Information obtained from the measurements of viscosities, osmotic pressures and optical properties. (Monday, March 15th.)

MEETING OF COUNCIL

A meeting of the Council was held on Monday, February 9th, 1948. Present: Sir Harry Lindsay (in the chair); Lord Aberconway; Sir Alexander Aikman; Professor E. N. da C. Andrade; Mr. F. H. Andrews; Mr. A. C. Bossom; Sir Frank H. Brown; Major W. H. Cadman; Sir Edward Crowe; Sir Thomas Dunlop; Mr. E. W. Goodale; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. Gordon Russell; Mr. William Will; Mr. J. G. Wilson and Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Andain-Holt, Robert Stanley, London.
Armstrong, Robert, Pinner, Middlesex.
Baillie-Searle, William Henry, Colham Green, Middlesex.
Baxter, Eric Donald, Peterborough.
Braven, Arthur Charles, A.R.I.B.A., London.
Busby, Ernest, London.
Chute, Miss Marchette Gaylord, New York City, U.S.A.
Clarke, George Alfred Francis, South Harrow, Middlesex.
Dunderdale, Geoffrey, M.D., B.S., Kenya Colony, E. Africa.
Forster, Edward Francis Bani, M.A., M.D., CH.B., Gambia, W. Africa.
Frith, Charles Albert, B.A., Todmorden, Lancs.
Gardner, Alexander, B.Sc., Aberdeen.
Gay, Thomas Johanas, London.
Gibbs, John, London.
Gilberthorpe, Fred, Sheffield, Yorks.
Grant, Lewis Colin, Liverpool, Lancs.
Handley-Taylor, Geoffrey, Heworth, York.
Hawkins, George James, Birmingham, Warwicks.
Heap, Samuel, M.Sc., Rochdale, Lancs.
Hoare, Geoffrey Gordon, Birmingham, Warwicks.
Hodgson, Captain Leonard Wilfrid, London.
Jones, Miss Mary Eirwen, B.A., Llandilo, Carmarthenshire.
Keep, Norman P., F.R.I.B.A., London.
Kingdon, Mrs. Eve Boucher, London.
Lay, Stuart Deighton, Coventry, Warwicks.
Murray, Ian Christian Andersen, London.
Osman, M. Louis, B.A., F.R.I.B.A., London.
Porter, Leslie Charles Humphrey, D.S.C., Guildford, Surrey.
Rance, Ernest, London.
Saunders, Kenneth Alfred, L.R.I.B.A., Ilford, Essex.
Shears, Leslie George, Mitcham, Surrey.
Spiwak, H. J., London.
Statham, Professor Ira Cyril Frank, M.ENG., Sheffield, Yorks.
Sutcliffe, Charles Chambers, B.Sc., West Wickham, Kent.
van Dulken, Mrs. Isabella Hicks, Caterham, Surrey.
Watson, Sir Alfred Henry, London.
Westrop, Brigadier Sidney A., C.B.E., D.S.O., M.C., B.Sc., Lincoln.
White, Thomas James, London.
Willis, Robert Arthur, London.
Woollatt, Leighton Hall, Exeter.

Approval was given to the Industrial Art Bursaries Board's proposal that the Society's Bursary Competition should again be held in 1948.

Preliminary consideration was given to the award of the Albert Medal for 1948.

Mr. O. P. Milne, F.R.I.B.A., was appointed to be the Society's representative on the Board of Architectural Education of the Architects Registration Council.

In response to the appeal which has recently been made, it was agreed to make a contribution of £100 from the Fund for the Preservation of Ancient Cottages towards the preservation of buildings adjoining the Guildhall at Lavenham, Suffolk.

A quantity of formal and financial business was also transacted.

R.D.I. EXHIBITION, AUTUMN, 1948

The Council at their meeting on February 9th agreed to support the Faculty of Royal Designers for Industry in the holding of an exhibition of their work in the Autumn of this year. The President and Council of the Royal Academy have also consented to the use of some of the galleries at Burlington House for this purpose. Further announcements concerning this exhibition will be made in the *Journal* from time to time.

1951 EXHIBITION

On December 5th, the Lord President of the Council, the Right Hon. Herbert Morrison, M.P., said in the House of Commons that the Government intended to sponsor a national celebration in 1951 to mark the centenary of the Great Exhibition of 1851, to consist of various festivals and exhibitions concerned with art and science. Bearing in mind the fact that the Society initiated the 1851 Exhibition, the Council have agreed with the Government that several rooms in the Society's house shall be made available for the use of the Co-ordinating Committee which is to be set up.

APPOINTMENT OF LIBRARIAN

The Council, in accordance with their policy of developing the Society's library, have now appointed a full-time librarian who will take up his duties with the Society on March 15th. Mr. K. D. C. Vernon, F.L.A., who has been given this post, is at present an Assistant in the Library of the Royal Institute of British Architects, where he has been since 1935, except for some years served in the Army, from which he was demobilised as a Major.

LETTERS FROM THE SOCIETY'S HONORARY CORRESPONDING FELLOW IN AUSTRALIA

The Secretary has received several letters from Mr. A. S. Lindsay, who is the Society's Honorary Corresponding Fellow in Australia, giving suggestions and advice to any manufacturing firms, who may be contemplating the establishment of a business in Australia. These letters may be seen by any Fellow on application to the Secretary.

REPORT ON THE INDUSTRIAL ART BURSARIES COMPETITION, 1947

INTRODUCTION

The Council of the Royal Society of Arts, through the Industrial Art Bursaries Board, continued in 1947 its annual offer of Bursaries to aid young British designers in Great Britain and Northern Ireland who are engaged in, or intend to enter, branches of industry in which design is of importance.

The competitions for these Bursaries, which were inaugurated in 1938, had to

be discontinued in 1942 owing to call-up of students for war service, but were resumed in 1946.

Bursaries of £150 each were offered in the following industries:

- (a) Furnishing Textiles.
- (b) Leather Goods.
- (c) Open-close Stoves.
- (d) Wallpaper.

In addition, the Council of the Royal Society of Arts agreed to make a further award not exceeding £150 if two candidates in any of these four groups were thought to be of equal merit. The Sir Frank Warner Memorial Medal was also offered for the best Furnishing Textile design submitted in the competition if of sufficient merit.

The Council desire to express their thanks to those firms who generously subscribed towards the cost of the Bursaries. They wish also to thank the Judges for their voluntary services, and further to thank the Principals of the many schools participating in the competition for their co-operation in making the competition known to their students, and for so kindly making all the necessary arrangements for the preparation and despatch of the designs.

JURIES' REPORTS AND AWARDS

Furnishing Textiles

In the preliminary stage of the competition candidates were required to submit either three or four designs for woven or printed fabrics executed since 31st August, 1946.

Fifty-three entries were received in this section, and the Jury selected fifteen candidates to participate in the final round, which was worked under invigilation in twelve hours during the two weeks commencing November 17th.

In the final stage, candidates were instructed to prepare two original designs for woven or printed textiles, in accordance with certain specific requirements.

The Jury regret that they are unable to recommend the award of either the Bursary or of the Sir Frank Warner Memorial Medal in this section of the Competition.

Competitors did not reach the necessary standard which has been attained in previous competitions organised by the Royal Society of Arts. Many of the entries submitted in the first part of the Competition appeared to reflect the style of individual instructors, but those submitted in the final round, which were worked under invigilation, did not reach the same standard.

The drawing and presentation of the entries were in many cases poor. Many competitors did not seem to appreciate that the primary purpose of a furnishing fabric design is to decorate a room either in the form of curtains or for upholstery coverings. A design for a curtain fabric must be visualised as it would be seen in use as a draped curtain, whereas a design for an upholstery fabric must be seen as that fabric will be used, *viz.*, as a flat surface. Very few competitors had grasped the principles of the appropriate scale for their individual designs, and most of the work submitted would require, if it were to be used commercially, considerable

adaptation. Some of the designs would, if reduced in size, have made quite pleasant dress designs.

Many of the designs, while quite pleasant in themselves, were insufficiently broad for printing as a furnishing fabric on any other than a very fine cloth, and would, therefore, have had a very restricted use. Many of the competitors depended too much on the style of drawing for their effect, resulting in designs of insufficient substance. This was particularly true in the drawing of floral motifs, the effect of which would be to give insufficient colour or decoration to a room.

Disappointingly few competitors submitted designs for weaving, and there was almost a complete absence of designs for jacquard weaving. As this is a field in which the industry needs new designs, the Jury would like to suggest that Art Schools should give students greater opportunity to design for this type of work. Many technical schools are now equipped with jacquard looms, and if these could be made available to art school students by closer co-operation between art and technical colleges, much good would result.

Finally, the Jury decided that the work of the following competitors was worthy of commendation, and they suggest that these students should be encouraged to enter for the competition again on a further occasion:

Printed Textiles

Miss Joan A. Badrocke (Worthing School of Art) and Miss Joyce E. Badrocke (Worthing School of Art). The entries of these competitors showed quite pleasant taste, but little originality; and were more suitable on the whole for designs for wallpaper or dress fabrics.

Woven Fabrics

Miss Margaret J. English (Manchester College of Technology). There was originality in the use of colour in the work of this competitor. The Jury felt, however, that she was not yet sufficiently mature to reach the required standard.

Miss Margaret Meades (Manchester Municipal School of Art). One of the final designs submitted by this competitor showed considerable taste in its presentation and conception. However, her other work did not support the impression made by this one design.

The Jury consisted of the following:

Mr. E. W. Goodale, C.B.E., M.C. (*Chairman*), Mr. Allan Walton, R.D.I., Mr. O. M. Power and Mr. M. Gardiner Morris.

Leather Goods

In the preliminary stage of the competition candidates were asked to submit not more than three designs for leather articles. Unfortunately, no entries were received in this section.

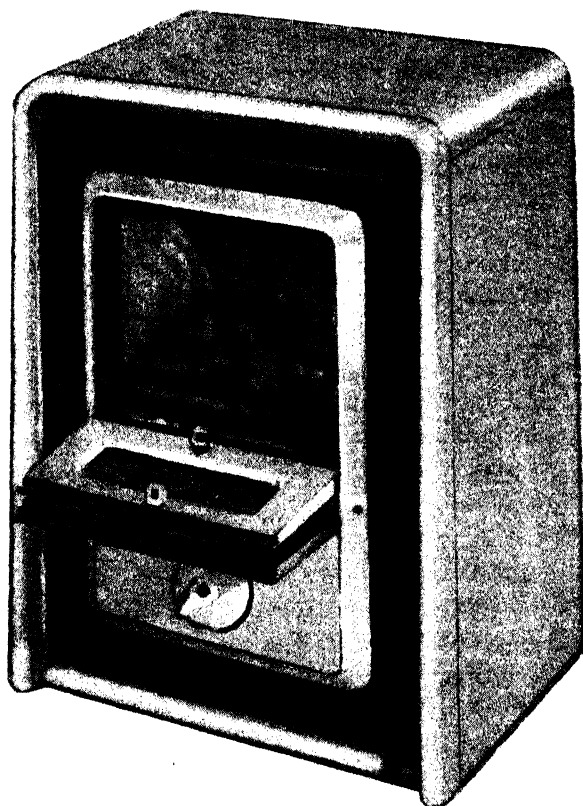
Open-Close Stoves

In the preliminary stage candidates were required to submit twelve three-dimensional designs for household equipment, including exteriors of open-close stoves.

Although twenty-three students submitted their names as candidates in this section, only six actually submitted designs, and of these the Jury selected three to participate in the final round of the Competition, which was worked under invigilation in thirty hours during the three weeks commencing November 10th.

In the final stage candidates were required to prepare an original design for an Open-close Stove, in accordance with detailed information supplied to them.

The Jury unanimously decided to recommend the award of the Bursary to Mr. R. T. J. Homes, a student at the L.C.C. Central School of Arts and Crafts.



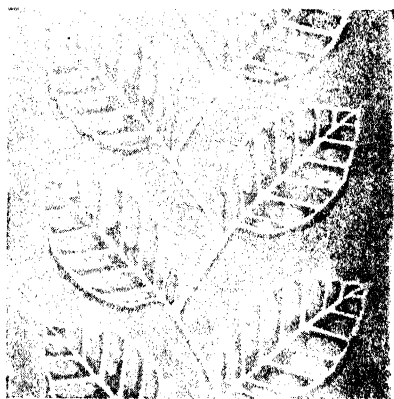
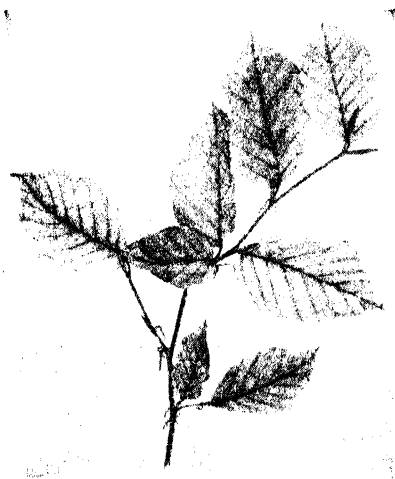
*Design for an Open-Close Stove submitted by
Mr. R. T. J. Homes in the final round of the competition*

While not believing in all the suggestions which this candidate made, and recognising that his design was not particularly revolutionary, the Jury felt that he had shown a very keen grasp of the requirements of design and had presented his work originally and well. He had gone to considerable trouble to think things out for himself and his stove could be manufactured quite easily. The Jury felt that he needed further training in design for Industrial products, but suggest that as the opportunities in this field are already well covered he might with advantage specialise on designing for the domestic solid fuel burning appliances industry in which extensive research and development is taking place, and in which there are undoubted opportunities for the right type of designer.

The following candidates were also highly commended: Mr. C. E. Matthews, a student at the Coventry Municipal School of Art, and Mr. D. G. Gale, a student at the Camberwell School of Arts and Crafts.

The former showed considerable intelligence in his design but not sufficient technical grasp. His design was rather plain and uninteresting and the surround was altogether too thin and flimsy making the casting very difficult to carry out. His scheme for the vent did not show much practical understanding of the problem of air control, while the method of door sliding proposed would make air control very difficult.

The work of the latter candidate, who is only 17 years of age, showed great promise and he had obviously tried hard, but he really needs more experience. They found his designs most interesting with much virile originality, though their presentation was rather inadequate.



Drawing of a spray of beech-leaves, with a conventionalised treatment, showing its possible use as a wallpaper design, submitted by Miss Lucy M. Hutchinson in the final round of the competition

The Jury were of the opinion that a better utilisation of fuel is to-day essential, and that the study of open-close stoves using utility fuels should be pursued both from the practical and the artistic viewpoint. There is need for "adventure" in the designing of this type of stove. No real object is served by a design for only a limited type or size of room, as the stove must be able to go into "good" rooms as well as into the "prefabricated" type of room. The Jury considered that this subject is worthy of much more consideration than is apparently now being given to it.

Finally, the Jury recommended that all three finalists should be given an opportunity of visiting foundries in order to improve their knowledge of the practical side of the industry.

The Jury consisted of the following:

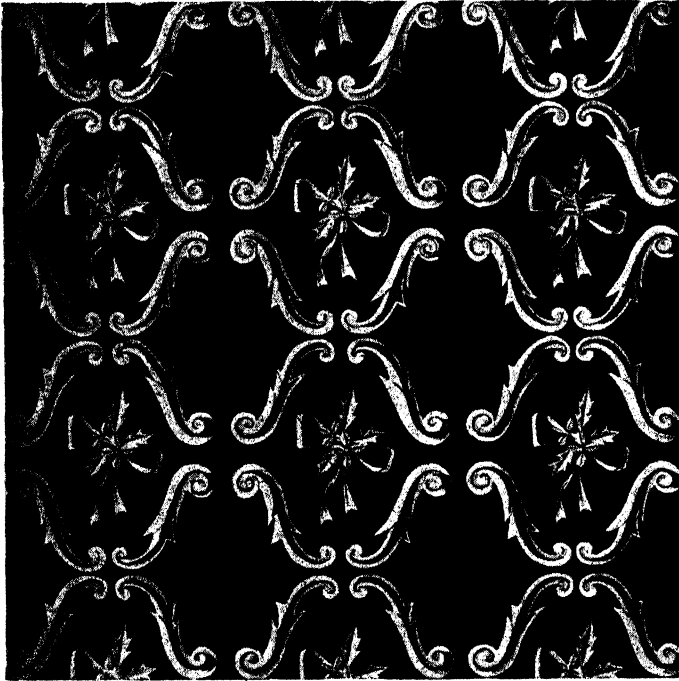
Mr. A. C. Bossom, F.R.I.B.A., M.P. (*Chairman*), Mr. Wells Coates, O.B.E., R.D.I., F.R.I.B.A., Mr. F. Bowen and Mr. A. C. Franklyn.

Wallpaper

In the preliminary stage of the Competition candidates were required to submit between three and six designs for wallpapers.

There were only five sets of designs submitted in the first round of the Competition, but of these one only, Miss Lucy M. Hutchinson, Manchester Municipal School of Art and now of the L.C.C. Central School of Arts and Crafts was considered to merit selection for the second round.

For her twelve-hour test in this round Miss Hutchinson submitted a natural study of a spray of beech leaves, together with a very charming formal treatment of the same subject.



*Design for Wallpaper submitted by
Miss Lucy M. Hutchinson in the first round of the competition*

Her designs throughout indicated a strong sense of tradition, with delicacy and originality of treatment, and provided she continues to design as she has begun she should make a name for herself in both wallpaper and printed textile work.

The Jury feel that her future studies should include a closer and more intimate association with industry. They suggest, therefore, that she should be advised to spend some time studying with one or two of the leading wallpaper and textile manufacturers in this country.

The other designs submitted in the first round of the Competition were characterised by a naïve simplicity. Most of them consisted of plain stripes or pink tartan stripes or the like, and were far too elementary in character. It was evident that with the exception of Miss Hutchinson, the competitors were ill-equipped to enter for a competition of this standard. The Jury urge that more attention

CANTOR LECTURE

THE COMMON COLD

By C. H. ANDREWES, M.D., F.R.S., *of the National Institute for Medical Research*

Delivered Monday, January 26th, 1948

In the spring of 1946, a group of us working under the Medical Research Council felt that the time was ripe for a renewed onslaught on the difficult problem of the common cold. We have since learnt that, at about the same time, several groups of workers in the United States had much the same idea. I cannot tell you to-day of the solution of this problem, but you may be interested to learn what is and what is not known about it and how workers are tackling the question.

The moment seemed opportune for several reasons. We have now learnt a good deal about the control of the major-killing plagues—cholera, typhus, typhoid, plague, yellow fever and smallpox; we no longer go about, at least in this country, in mortal fear of these infections. We can, therefore, afford to turn our attention to the lesser plagues, the miseries and inconveniences, such as influenza, sore throats and colds. These do in fact kill the very young and the very old and they are particularly important because of the great wastage of valuable man-power which they cause.

Another reason for renewing the attack was the great development in recent years of knowledge as to how to grow and study viruses. In 1930, Dochez and his colleagues¹ showed that chimpanzees could be infected with filtrates of nasal secretions from persons with colds. They also claimed to have cultivated the virus.² The susceptibility of chimpanzees has been confirmed by others, but not the cultivation experiments. Since that time several methods have been developed for growing viruses especially in fertile developing hen's eggs. Fertile eggs have proved to be the experimental animals—if you can call them that—in which the largest number of viruses can be grown. Attempts have been made to grow about 60 different viruses in eggs, and one or other of the available techniques has been successful in about 45 instances or 75 per cent.³ So growth of cold virus in eggs seemed more likely to be successful than any other method. There are several fluid-containing cavities in developing eggs—the yolk-sac, the amniotic and allantoic cavities. Differently aged embryos and different methods of inoculation are used for the different cavities—but I will not go into technical details. One method has proved best for some viruses, another for others. Within the last two or three months, two groups of workers in America^{4, 5}, have reported success in growing common cold virus in embryonic fluids of eggs. I shall return to discuss their work later.

COLDS AND COLD-LIKE DISEASES

Before I describe the Common Cold Research Unit at Salisbury and the methods we are using there, I must say something about some of the difficulties to be faced and about some of the puzzles about colds which have to be solved. The minor miseries, I spoke of, constitute a hotch-potch of diseases all affecting the nose and throat—the so-called upper respiratory infections; these grade into each other

clinically in a confusing manner. Whether your particular illness is called 'flu, grippe, a chill, an influenzal cold or just a cold has been more a matter of the taste and fancy of your own particular doctor than of any great scientific accuracy. We are, however, beginning to get things sorted out.

Influenza was the first definite entity to be separated from the bunch. When it was found, in 1933, that from influenza patients a virus could be obtained which would infect ferrets⁶, the way was laid open for a flood of investigation which has made it possible to diagnose this infection exactly in the laboratory. We can now, therefore, study its habits without any confusion from other diseases which resemble it at the bedside. Work on the production of a preventive vaccine against influenza has also made great strides. Progress is also being made in America on the separation of other ingredients of the hotch-potch: one is a form of sore throat due to a virus.⁷ Another is also caused by a virus which is capable of producing in some people a mild snuffly illness without pneumonia, in others a mild form of pneumonia, so-called primary atypical pneumonia.⁸

Having eliminated influenza and these other things, we are left certainly with the common cold, and probably with a few unsorted infections. We cannot yet exactly define the common cold and separate it from other infections, for lack of an experimental animal or a simple laboratory test wherewith to recognise its presence. You, Sir and Madam, know when you have got a common cold with just as much scientific accuracy as do I, who am particularly studying the subject. You will begin to see, as this lecture goes on, that I shall tell you much more about our ignorance than about our knowledge of the common cold.

One thing we do know, that nasal secretions from a cold sufferer can be passed through a fine filter which will hold back all the larger bacteria and yet, when dropped into a normal person's nose, will produce a cold. This makes it likely that the causative agent is a virus, one of those minute parasites smaller than the bacteria and not susceptible of being cultivated apart from living cells.

TYPES OF INFECTION

I must digress a little further before getting back to colds. Infectious disease caused by viruses—and the same is true of other parasites—is conveniently considered in terms of a relationship between the parasite and its victim or host. The attack of the parasite and the discomfiture of the host may be a fairly straightforward and obvious affair. Consider measles. The measles virus, like the cold virus, probably gets into the air when a victim sneezes, becoming air-borne on a tiny particle of saliva and then gets inhaled by a susceptible child. Breathing in of a very few measles virus particles is probably enough to lead to the due development of a new measles case—and so on. The waxing and waning of an outbreak depends mainly on the supply of susceptible children. Once a child has had the illness, he is no longer a "susceptible", being resistant to further attack, usually for life. Infection is almost wholly from active cases. Normal people do not carry the virus about and act as a source of infection to others.

Though you may regard that as a normal typical pattern for an infectious disease, anything as simple as that is probably the exception rather than the rule. When a

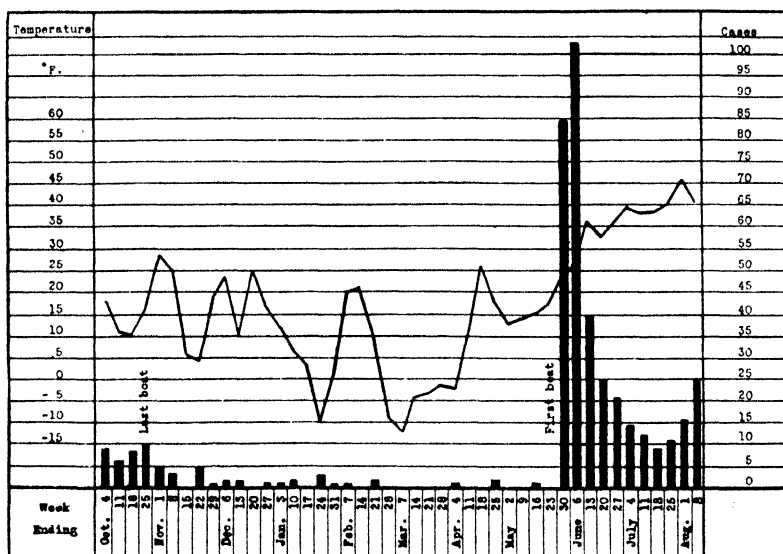
parasite and its host have been treading the path of evolution together for many centuries, they have probably reached a state of equilibrium, a balance of power. The parasite may well live in the host and be tolerated there, evoking no violent reaction such as would be obvious as an acute disease. Only when something comes along to upset the balance do we become aware that there is a parasite there at all. In mice we find a whole row of viruses present in the lungs, the gut or the brain, causing no trouble until we stir things up in such a way as will bring the latent infection into the light of day. In man, the fever-blisters which often appear on lips or nose during fever, are caused by a virus, that of herpes simplex, which is probably there year in and year out and only shows itself when some stimulus, such as a fever, upsets the balance and allows it to become temporarily able to inflict a little damage. In considering how the cold virus causes disease, we must bear in mind that its effects may put it in this last class of infections rather than along with measles; or perhaps it belongs in an intermediate group.

INFECTION AND CHILLING

What makes you get a cold? Dropping cold virus up your nose can do so, as I have already said. Is that the whole story? Does contact with another victim always precede your own infection? What about the people who say they get colds from sitting in draughts or getting their feet wet? Are those colds due to virus or to something else? On this matter of wet feet or other chilling, people seem to hold most decided views. Some maintain firmly that certain types of exposure to cold invariably bring on colds. Others are equally sure that the whole idea belongs to the realm of mythology, a relic of medieval medicine. There was a trapper in Spitzbergen⁹ (I shall deal more fully with Spitzbergen later) who developed a cold after contact with a centre of civilisation. Back in isolation he duly recovered, but six weeks later had the misfortune to fall into icy water, subsequent to which his cold returned. What did his fellow trappers say? "Silly ass for falling into the water!" Not at all! They were much more far-seeing. It was rather, "Silly ass for going into town! If you keep away from town, you can fall through the ice with impunity as often as you like". In favour of this viewpoint is the well-attested fact that Arctic explorers, exposed to all sorts of hardships away from civilisation, will get no colds. The dangerous thing for them is coming back to town again. I know of no deliberate controlled experiments on this matter of colds and exposure. It seems safe to agree that chilling alone cannot give you a cold (at least in the Arctic), and that a big dose of virus alone *can* do it experimentally in the absence of chilling. It is possible that in ordinary life we get colds from a lot of exposure in the presence of a little virus, or from very moderate exposure if we take in a big dose of virus. Either exposure to cold or exposure to *a* cold may appear to us *the* cause of our discomforts. I have talked, for the sake of simplicity, of only two factors in producing a cold, contact with the infective agent and chilling. In fact it is almost certain that the matter is more complex than this, and that quite a number of other factors come in to confuse the issue.

Let us return to Spitzbergen. In a most interesting study Paul and Freese⁹ reported that the inhabitants of that remote Arctic island were—at least in 1933—cut off from the outside world for seven months of the year. During this time, which

of course was the winter, they remained pretty well free from colds. On the arrival of the first boat in May, a sudden epidemic of colds broke out, beginning with the storekeeper who had most contact with strangers. These strangers from the ship might not themselves have any colds. A few of the Spitzbergenites might have second colds during the summer, but such infections soon disappeared after the last ship had left in the autumn. Similar stories can be told about other isolated communities, such as settlements of Eskimos in Labrador.¹⁰ Nor are wholly Arctic conditions essential, for just the same story is related in Boswell's "Life of Johnson" about an epidemic of colds in the inhabitants of the remote island of St. Kilda immediately after the rare event of a visit from a ship. Such experiences make it almost certain that cold epidemics can be initiated by introduction of an agent from without.



(Reproduced by courtesy of the American Journal of Hygiene from the Article by J. H. Paul and H. L. Freese, 1933, p. 520, vol. 17.)

FIG. 1.—Weekly incidence of colds at Spitzbergen shown in relation to fluctuations of temperature

But how to explain the great susceptibility of isolated communities is not easy. It may be that there are lots and lots of cold viruses, producing similar symptoms but no cross-immunity. By that I mean that one can acquire after infection resistance to the virus causing that particular cold but no concomitant resistance to other cold viruses. On this idea, one would suppose that a small group of people might soon become used to its own viruses but would lose, during the seven months' winter, all power of resisting outside viruses. If this were all, it would seem that all the trappers, even those who never made jaunts to town, would be likely to catch colds when they got their feet wet. They should on this argument have their resistance lowered to any viruses that were carried in any Spitzbergen nose. An alternative seems to be that the cold virus is only "carried" by occasional symptom-free people, and normally keeps going only by being wafted from one extra-susceptible person

to another of the same sort. When all the extra-susceptibles are used up, the virus will die out, till the next ship turns up, and fresh viruses are introduced.

Some recent experiments make it perhaps unnecessary to postulate the existence of a whole family of cold-viruses. Dingle and his co-workers⁷ dropped cold secretions into five volunteers' noses and produced colds in four of them. Some of the material was meanwhile stored in the cold, under conditions known to preserve the virus' activity. Nineteen days later the four colds had cleared up well and the five people received up their noses the identical material out of the cold store. Again four out of five developed colds, a little milder than the first colds: this time one of the colds appeared in the fifth volunteer, the man who resisted the first instillation.

Our own experiments, to which I shall refer later, are in agreement with the idea that resistance to a cold does not depend very greatly on when one had one's last cold, but on other factors not at all understood.

EFFECT OF SEASON AND WEATHER

It is familiar to all of us—and statistics for once in a way support the popular opinion—that colds are commoner in winter than in summer, as are other respiratory infections. In point of fact we do not know why this is. It is not simply a question of temperature. The changing incidence of colds—often as waves of increased prevalence—has been plotted for various North American cities.¹¹ You might expect that as lower temperatures were reached, the wave of colds would travel from the northern states, which got cold weather soonest, down southwards. Not at all; the waves occur almost simultaneously from the colder Canadian border, down to the Gulf of Mexico. What may have some influence is the occurrence of sudden temperature-changes, particularly abnormal ones, and these may precipitate colds more in the summer than in the winter. Some writers have tried to trace an association of colds with humidity and with other meteorological happenings, but without carrying great conviction. Cold weather could, of course, act indirectly by making people crowd together indoors instead of sitting in the park or the garden, or at the worst, in rooms with wide-open windows. Crowding together can, however, hardly be all-important, for in London hundreds of thousands of people must travel daily by train, tube or bus all through the year: and why should colds not spread in tube trains in rush-hours in July? Whether or not public transport vehicles are in fact dangerous places for picking up colds is matter upon which research is needed.

So far I have told you of one unanswered question after another. How are we to attempt to answer all these conundrums? We could diffuse our efforts by striking out in all sorts of directions; but it seems to me that we need one thing above all others. We need a means of recognising the existence of the common cold virus in the laboratory without the costly and cumbersome and uncertain technique of using human volunteers. We could then find out if we were dealing with one cold virus, or many. We could find out definitely how the virus spreads. I could catalogue dozens of things we could do, if only . . . ! I have already told you how the finding that ferrets were susceptible to influenza provided a means of laboratory attack on the influenza problem, and of the advances in many directions which immediately ensued. If we could find an animal which would catch colds we should

be in a similar favourable position; if we could find a method of recognising the virus in the test-tube or in some other simpler way, we should be even better off. I have already mentioned how, in 1930, Dochez and his co-workers¹ found that chimpanzees would catch beautiful colds from human beings. But chimpanzees are very expensive, there are very few to be had, they are very strong and difficult to handle. We have known that chimpanzees will catch colds for nearly 20 years, but that knowledge has been of extremely limited value. Chimpanzees are in fact almost useless for our purposes. Other animals including smaller monkeys, cats, rabbits and hedgehogs develop snuffly noses, but existing evidence suggests that these snuffles are not related to human colds.

THE SALISBURY UNIT: THE PLAN

Our plans for attacking this problem involved extensive tests on human volunteers.¹² I have already said that human beings are unsatisfactory experimental animals and so they are. We use them because they are the only animals available to us. Our plan of campaign has been to take nasal washings from people with colds, filter this material to remove the larger bacteria, and drop it up the noses of volunteers to see if a virus is there. If it is, the volunteer should get a cold. Then we put this material, known to contain a virus, into eggs, incubate the eggs, remove the fluids from the eggs after a few days and put that up the noses of more volunteers. If they got colds, the virus would at least have survived some days in the egg and we should be on the road to finding out how to grow it. We have carried out experiments, the general idea of which I have outlined, using a great variety of inoculation-techniques of eggs, and along other lines not involving eggs. One reason why the human being is unsatisfactory is that his resistance to colds varies so much. Our best filtrates infect not much more than half our subjects; so to allow for the intervention of chance each material to be tested has to be put into at least four people.

SALISBURY: THE HARVARD HOSPITAL

When we first planned to work on these lines, we were fortunate in finding available a hutted hospital at Salisbury, put up during the war by Harvard Medical School and the American Red Cross. At the end of the war it was given by them to the Ministry of Health. It consists of very comfortable huts, equipped with central heating. Six of these huts were divided into two, making 12 volunteers' flats. In each we house a pair of volunteers for periods of ten days. Thus, we can take 24 volunteers at a time. During their ten days their only human contacts are with the gowned and masked doctor and matron who visit them daily. Each pair has a comfortable sitting-room, equipped with radio, internal and external telephone, books and games; a little dining-room, with electric kettle, cutlery and crockery; and each volunteer has his or her own bedroom. Hot meals in thermos containers are taken round three times a day on an electric trolley and delivered at the entrances to flats. Volunteers are allowed to go out for walks into the country with their own partner—provided they avoid other people, vehicles, buildings and built-up areas. Members of a pair can also play, with each other, games such as table-tennis and badminton which are available in outlying huts, with precautions which will make it unlikely that any infection can be transferred to the pair next using the hut. Besides getting ten days' free holiday, volunteers get 3s. a day pocket money and travel

vouchers to and from Salisbury. Our Harvard Holidays are becoming quite popular, especially amongst students in their vacation times.

SALISBURY : TESTS ON THE VOLUNTEERS

Volunteers arrive on a Wednesday. They have a routine clinical and X-ray examination, but nothing else is done for three days. This three days' quarantine gives a chance for the development of a spontaneous cold, picked up perhaps in the train on the way down. If they remain free from symptoms during this quarantine, they receive, on Saturday, drops of the material under test run up their noses with a pipette. They are given sheets on which to record daily any symptoms; the matron visits them daily to take pulse and temperature readings and the doctor to examine and question them. At the end of their ten days they have an opportunity to compare notes with other volunteers; they then depart and the doctor makes a judgment on the basis of the records as to whether they have had a cold or not.

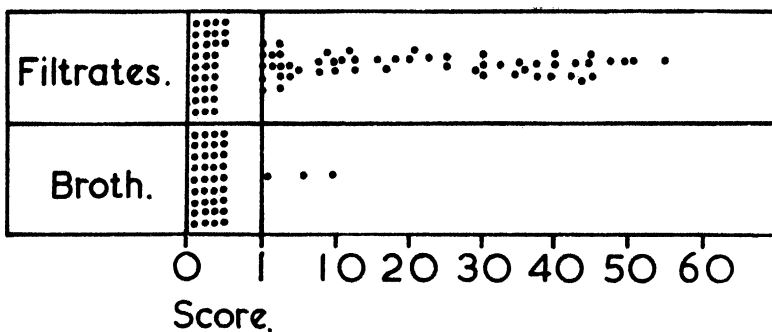


FIG. 2.—Severity of colds produced by filtrates of nose washings and by control material (broth). An arbitrary score was given to each cold on the basis of severity of symptoms. Each dot represents a cold in one volunteer

CONTROLS

This judgment is easy if the colds are “real streamers”, or if symptoms are wholly absent. But in many instances judgment is difficult and may depend to some extent, though never wholly, on subjective impressions on the patient's part. To avoid any bias, through knowing whether or not to expect a cold, some of the volunteers always receive inert material such as saline or bacteriological broth known not to contain virus. Neither doctor nor patient knows the nature of the material; this is given a code letter by the bacteriologist supplying it from the laboratory. The doctor may only see the key to the code after he has committed himself as to diagnosis. Those receiving inert material are called our “controls”; they serve a further useful purpose in assuring us that our quarantine period and our isolation precautions are adequate. If they began getting colds we should know that something was wrong.

RESULTS

So far over 500 volunteers have been to the Harvard Hospital. We have learnt the following things. Our technique is sound in that our “controls”, given saline and broth, do not get colds. Bacteria-free filtrates of washings from “cold” sufferers have produced colds in about 50 per cent. of subjects. This has happened all through the year, with possibly a rather lower percentage of “takes” in winter. The colds are

mostly mild and of the runny type: we have got to know their clinical features and duration. The time from inoculation to onset has been usually two to three days. We cannot dilute the nasal secretions beyond 1 in 100 and still obtain "takes". We can store the active agent for over six months at -76° C. in dry ice and still get "takes": this has been of great practical value, as we can store our virus thus and keep going back to material of known activity. We can get the virus through a collodion membrane with pores of known size and thus learn that its diameter is somewhere near that of the influenza virus—that is about a ten-thousandth of a millimetre. These findings are all incidental to our main quest, for which most of



FIG. 3.—View of part of the Common Cold Research Unit at Salisbury, showing volunteers' huts connected by covered ways

the volunteers have been used. Here we cannot yet report victory: we have not yet succeeded in growing the virus in eggs or in other ways, though for a time we were falsely led to hope that we had succeeded. We are still trying, in one way after another.

AMERICAN WORK

This autumn, Pollard and Caplowitz⁴ working in Texas reported that they had cultivated the cold virus in eggs; and last month (December, 1947) Topping and Atlas⁵ from the National Institute of Health near Washington made a similar claim. Have they been successful where we have failed and if so why? We have tested a number of virus strains by, so far as we know, the same techniques as theirs,

but without any success. Small technical differences may account for everything, but another explanation is equally likely. There are certainly "colds and colds". Those produced in Topping and Atlas's experiments are stated—I quote from a Press interview with Dr. Topping—to be of a "thick, severe, form, something like what we know as sinusitis" and with a "drip from the sinuses into the throat, fatigue, nasal obstruction, a little fever, mild laryngitis and a . . . cough . . . not the runny-nose, runny-eye sort of cold". This description sounds very unlike the colds we have been studying, which are certainly of the runny-nose type. It may be that we still have to wait for a clue about that sort of cold, which I think is the kind most frequent over here.



FIG. 4.—A corner of the sitting-room in the volunteers' quarters

AIR-HYGIENE

At the Harvard Hospital, Salisbury, besides the work with volunteers of which I have told you, there is also an Air-Hygiene Unit, the work of which, I am glad to say, is becoming more and more mixed up with that of the common cold team. As you know, intestinal diseases like typhoid, cholera and dysentery have been banished, or nearly so, from Britain through improvements in water hygiene. Air-hygiene hopes to do as much for airborne respiratory infections. Treatments of air with ultra-violet lamps and chemical mists are amongst its tools and its motto is, or has been, "coughs and sneezes spread diseases". Wells¹³ has lately popularised the doctrine that minute "droplet-nuclei" are of special importance in spreading disease. The larger particles emitted during sneezing fall rather quickly to the ground, but the tinier ones very rapidly lose water by evaporation and thus become so small and

light that they can float in the air for an hour or two. These are the "droplet-nuclei" which may still be detected in the air an hour after a sneezer has left a room. Ultra-violet light and some chemicals are rather effective in destroying these. The larger particles, however, which fall down and are incorporated in dust, may later get redispersed into the air, and they are then much harder to kill by the aid of these methods. Some recent evidence suggests that more unpleasant germs get spread from the nose than from the mouth and throat: this leads to the question of whether bacteria and viruses accidentally shaken out of handkerchiefs may not be of tremendous importance. Tests at Salisbury have shown that very many bacteria may thus be shaken out and remain for a time in the air: handkerchiefs from the later stages of a cold are particularly effective germ distributors. Work now in progress suggests the possibility that impregnation of handkerchiefs with a disinfectant (phenyl mercuric bromide seems the most promising) may make them much less dangerous in this respect.¹⁴ This may be important: infected handkerchiefs may be a danger not merely because of what is shaken off them into the air, but because handling contaminated handkerchiefs necessarily spreads germs on to the hands and thence on to everything a person touches.

A major difficulty in trying to control the spread of respiratory infections is that all the things I have mentioned may be important: the germs left in the air after a sneeze, those blown about in dust, those coming off a handkerchief or off your hands, and so tests of preventive measures may yield wholly negative results unless measures against all these vehicles of infection-spread are undertaken at the same time.

PREVENTIVES AND CURES

Comments in the Press on researches about colds usually end up by saying "Now that the virus is, or is about to be, isolated, the next step will be the preparation of a vaccine". I suspect that newspapers keep the type of this stock-expression permanently set up. Seeing that immunity to a cold is so short-lived, I should be rather surprised if the solution to the cold problem came along the lines of a vaccine. There are many other possibilities some of them suggested by the work on Air-Hygiene. To me a "cold-cure" is even less of a practical proposition: "prevention is better than cure" every time.

As a result of Press and B.B.C. notices about our Salisbury work, we have had scores, perhaps hundreds, of letters from people telling us of drugs or lines of conduct which will certainly prevent or cure colds. One writer even told us how his cold was cured by the fall of a V2 in his immediate vicinity, but he did not go into the practical application of this observation. No doubt many of you are longing to tell me of your own solution. I am told there are 10,000 cold cures registered at the Patent Office. The reason why so many preventives and cures exist is that one's susceptibility to colds is so variable. Many people have colds one year and none the next. If they happen to have used a particular remedy in the second year, they swear by it and recommend it to their friends, or write to us, or take out a patent. In a carefully controlled trial of a vaccine on students,¹⁵ 55 per cent. of those given vaccine were satisfied that it had reduced their cold-incidence; but slightly better benefit was claimed by the controls who had received only saline injections. Again, many people tell us that they always know when a cold is coming on; but that if they do so and so,

or take such and such a remedy, their cold is aborted. Our recent experience makes us suspect that the large majority of incipient cold attacks abort anyway, and that it is only the exceptional infection that breaks right through your defences and lays you low. This habit which colds have is very convenient for the continued reputation of patent medicines.

I fear this lecture has mostly talked about our ignorance—ignorance of why we get colds, of what causes them, of how they are spread, of how to prevent or cure them. But we are beginning to pick up a few clues; and several teams in several parts of the world are devoting to the problem all the attention they can.

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GENERAL NOTE

SOME FORTHCOMING EVENTS, SPRING AND SUMMER, 1948.—Several important and interesting conferences, congresses and exhibitions have been announced for the Spring and Summer of this year. From March 2nd to 25th the *Daily Mail Ideal Home Exhibition* celebrates its silver jubilee at Olympia in London, with six miles of show windows and special displays, which will include a comprehensive exhibition of British clockmaking. From June 23rd to 25th an *International Rubber Technology Conference* is being held in London for which a full programme of papers has been announced. At the last conference of this nature, in 1938, 553 delegates attended and over 100 papers were contributed. During July the *XIVth Olympiad Exhibition of Sport in Art* is being held at the Victoria and Albert Museum. The exhibition is being held in connection with the Art Competition of the Olympiad, which is concerned with Town Planning and Architecture, with Painting, and Graphic and Applied Arts, and with Sculpture, to include also Reliefs, Medals and Plaques. All the entries must be concerned with sport and each of the 49 participating nations is allowed to submit three entries in each of the sub groups. There will, at the same time, be a parallel competition in Literature, under the headings of Lyric, Dramatic and epic works, and in Music. From August 9th to 21st, an *International Landscape Conference and Exhibition* is being held in London. The theme of the conference will be "The Work of the Landscape Architect in Relation to Society"; and of the Exhibition "The Landscape of Work and Leisure". The *Seventh International Congress of Applied Mechanics*, which will include sections on Elasticity and Plasticity, Aerodynamics, Hydrodynamics and Meteorology, Thermodynamics and Heat Transfer, and Vibrations, Lubrications and Experimental Methods, will be held in London from September 5th to 11th. From September 21st to 25th the *First International Congress of Rheology* is being held at Sheveningen, Holland.

During most of 1948 the Council of Industrial Design, in co-operation with the Federation of British Industries and the Association of Chambers of Commerce, and with the full support of local Civic Authorities, is holding *Design Weeks* in various provincial centres—among others Cardiff, Manchester and Birmingham. The focal point of these will be an exhibition designed by James Gardner, O.B.E., R.D.I., M.S.I.A., and among other activities will be a series of conferences between manufacturers, retailers and industrial designers, and the showing of special films.

NOTES ON BOOKS

MEN OF TASTE. By Martin S. Briggs. Batsford, 1947, 15s.

This book tells briefly of men, famous in history, who in their lifetime benefited mankind, not by creating things themselves but by helping others to do so—by seeing, in some cases, the necessity and employing the right man, and in others by creating the need. It is an all too brief story of patronage in art and is of particular interest to us to-day because it is doubtful if such patronage is now possible. This is not the place, neither is there the space, to develop on reasons. The men in this book enjoyed the work they did. To-day we are too busy to taste of true enjoyment.

It would be interesting to see a further book on the subject dealing with men of this century. Mr. Briggs in his introduction says that he intended including Hitler and Mussolini (it would have been interesting to read what he had to say about them), but was dissuaded by his publishers. We have been fortunate with patrons during the past fifty years, and they should receive acclaim. One naturally worries about the present and future, for the austere conditions existing throughout Europe are not conducive to grand scale developments. Who is there to-day to emulate the wealthy potentate or great land-owner of the past? It would appear that their place must be taken by the leaders of large industrial concerns, but how few of them are aware of their great responsibilities.

Where taste is concerned one inevitably reverts to the question "What is Beauty?" Mr. Briggs does not attempt to explain beauty, but cites examples of great works engendered in the mind of the patron. Beauty is not a consistent quality, it will vary according to the conditions of the time. Beauty that was recognised in the time of Rameses would not necessarily be so to-day. A given age will demand things particular to that age, and patrons must encourage things in demand, but at the same time endeavour to lead public taste to new but good levels.

Some periods in history have been more conducive to æsthetic development than others, and men such as Rameses and Pericles were fortunate in their time. Other men had a very hard fight and only through sheer dictatorship were they able to achieve their desires. To-day the problems that would confront any leader who wished to further the projection of masterpieces, such as we have inherited from the past, would be prodigious. Works were produced in olden days for the pleasure of the few. We live in a different age, and are very little concerned with individual works. The individual object of the past had the undivided attention of the artist. The mass-produced object of to-day is the result of many forces. The manufacturer will be a good patron only if he will see to it that the artist is allowed to express his ideas in his own and peculiar manner—yes, peculiar, for the past 200 years have placed the artist in an invidious position, as a man apart—and help him to multiply them with the aid of the machine. If he insists on utter integrity he will indeed be a man of taste fitted to his day, and his reward will be great.

What a galaxy of names this book presents! Rameses, complete despot with untold power behind him, Pericles, dictator, friend of the artist, Justinian, Charlemagne, who showed such a marked interest in the development of M.S.S. ivories, gold and silver work, mosaics and enamels, the powerful Wolsey who wrote:

"Expertest artificers that were both farre and nere,
To beautifie my howssys, I had them at my will."

And so, through the ages, until we come to Ruskin and Morris, both of whom were profoundly discontented with the æsthetic development of their day.

They were all typical of their time. Some achieved greatness because of the peculiar conditions of their time; others would have been great no matter when they had lived, for they had qualities that are timeless. A few were master craftsmen themselves; others had no concept of doing practical æsthetic work but were imbued with a spirit that made them think of their fellow men. They were the inspirers and projectors of schemes, and they possessed genius for imagination, and for organisation.

RECO CAPEY.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

- MONDAY, MARCH 1** Engineers' Society of at the Geological Society, W 1 5.30 p.m. D C Lynn "Oil Burning Pressure Jet Installations."
Farmers' Club at the Royal Empire Society, W C 2 2.30 p.m. Professor G. I. Blackburn "Oil as a Farm Crop."
- TUESDAY, MARCH 2** British Decorators' Institute of at the Royal Society of Arts, W C 2 6.30 p.m. F. L. Scott "The Place of the Interior Decorator in the Community."
- WEDNESDAY, MARCH 3** Fuel Institute of at the Institution of Mechanical Engineers, S W 1 2.30 p.m. J. I. O'Brien "The Application of Instruments and Automatic Control to Pulverised-Fuel-Fired Plants."
- THURSDAY, MARCH 4** Chartered Auctioneers' and Estate Agents' Institute, at 29 Lincoln's Inn Fields, W C 2 6 p.m. J. A. Hinks "The Trend of Values of Real Estate in the Past Decade, and a Forecast."
East India Association, at Overseas Hotel, S W 1 2.30 p.m. Eric D. Costa "The Industrial Prospect in India in the next Five Years."
Horological Institute, British at the Royal Society of Arts, W C 2 7 p.m. Frank Mercer, "Horology in the United States."
Metals Institute of at the James Watt Memorial Institute, Birmingham 6.30 p.m. I. Hudson "Precision Casting."
Royal Society, W 1 4.30 p.m. H. A. Newman "Calculating Machines."
- FRIDAY, MARCH 5** Atomic Scientists Association at the Royal Society of Arts, W C 2 7 p.m. Dr W. J. Aitoll "Medical and Biological Applications of Atomic Energy."
Mechanical Engineers' Institution of S W 1 5.30 p.m. E. H. Banister "Wave Action Resulting from Sudden Release of Compressed Gas from a Cylinder."
Public Analysts' Society of at the Royal Society, W 1 5 p.m. Dr M. Bennett "The Proximate Analysis of Mixtures by Methods depending on Differential Solubility and Saturation."
- Royal Society, W 1 9 p.m. Sir Edward Salisbury "Flowers of Spring."
- MONDAY, MARCH 8** Purchasing Officers Association, at the Royal Society of Arts, W C 2 6.15 p.m. W. H. Mapp "Pipes."
- TUESDAY, MARCH 9** Architects' Royal Institute of British, W 1 6 p.m. Howard Robertson, "The American Scene."
- CHURCHILL INSTITUTE of at the Geological Society, W 1 11 p.m. W. H. Wheeler and J. L. C. Topps "Rocket Propulsion: A Restricted Survey."**
Engineering Department of the Institution of Engineers' Institution of at the Royal Society of Arts, W C 2 7 p.m. S. F. Page "Surface Finish."
- WEDNESDAY, MARCH 10** Institution of at 26 Portland Place, W 1 5.30 p.m. H. S. Gibson "The Production of Oil from the Fields of South-West Iran."
- THURSDAY, MARCH 11** Design and Industries Association at the Royal Society of Arts, W C 2 12.30 p.m. C. H. Golding, "Is the Designer really Fulfilling the Needs of Industry?"
- Photographic Society, Royal S W 7 7 p.m. A. R. Hewitt "The Even Illumination of Photogravure Printing Frames."
- Royal Society, W 1 4.30 p.m. (1) D. W. J. Axford and K. G. W. Norrish "Oxidation of Gaseous Formaldehyde." (2) Sir Alfred Lgeriton and J. Powling "The Limits of Flame Propagation at Atmospheric Pressure."
- Sound Recording Association and the Physical Society at the Royal Society of Arts, W C 2 5.45 p.m. D. F. J. Shorter "Loudspeakers, with particular reference to High-Fidelity Monitoring Reproducers."
- FRIDAY, MARCH 12** Mechanical Engineers' Institution of S W 1 5.30 p.m. (1) Professor J. I. M. Morrison "The Criterion of 'Yield' of Gun Steels." (2) Dr W. M. Shepherd "Plastic Stress-Strain Relations."
- Royal Society, W 1 9 p.m. Dr T. I. Allibone "Lightning and Spark Phenomena."



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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4764

FRIDAY, MARCH 12th, 1948

Vol. xcvi

MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

MONDAY, MARCH 15TH, at 4.30 p.m. (last of three Cantor lectures).—“COLLOIDS”, by Eric K. Rideal, M.B.E., D.Sc., F.R.S., Fullerian Professor of Chemistry, Royal Institution. The lecture will be illustrated by lantern slides and experiments.

TUESDAY, MARCH 16TH, at 2.30 p.m. (Dominion and Colonies Section).—“CO-ORDINATION OF RESEARCH IN THE PACIFIC”, by E. Marsden, C.M.G., C.B.E., M.C., D.Sc., F.R.S., Scientific Adviser to the New Zealand Government. Patrick C. Gordon-Walker, M.A., B.LITT., M.P., Parliamentary Under-Secretary of State for Commonwealth Relations, will preside.

WEDNESDAY, MARCH 17TH, at 2.30 p.m.—“AFFORESTATION AS A WORLD PROBLEM”, by H. G. Champion, C.I.E., M.A., Professor of Forestry, Oxford University. J. L. Simonsen, D.Sc., F.R.S., Director of Research, Colonial Products Research Council, will preside. The lecture will be illustrated by lantern slides.

BACK NUMBERS OF THE JOURNAL

From time to time Fellows write to offer to the Society back numbers of the *Journal*. Unfortunately most of these kind offers now have to be declined owing to lack of storage space. It is suggested that, if Fellows wish to dispose of copies of the *Journal*, they should offer them to their local library, technical college, school of art, or similar institution.

RECENT PROGRESS IN THE MAKING OF PRECISION INSTRUMENTS

By A. J. PHILPOT, C.B.E., M.A., B.Sc., F.INST.P.

Director of Research, British Scientific Instrument Research Association

Ninth Ordinary Meeting, Wednesday, January 28th, 1948

W. H. ECCLES, D.Sc., F.R.S., *in the Chair*

THE CHAIRMAN: Ladies and Gentlemen, the paper we are to hear read by Mr. Philpot this afternoon is on the subject of precision instruments, a subject of growing importance. Its importance arises principally out of the development of the gauge method of checking manufactures and the development of machine tools. To see what that development has been, one need only think back fifty years if one is old enough, and one can remember

seeing craftsmen using steel scales and callipers and working to what they affectionately called a "thou". To-day machine tools—making engineering products of very many kinds—are operating at high speed and to a tenth of a "thou". One need only think again of the making of watches. When I was a boy, it was a relatively slow process. Now it is a very quick one, and probably a great many of the watches made are better than those that used to be made. All these things have been made possible by the development of precision instruments, the subject of our paper.

Mr. Philpot has had great experience of these developments. He has been twenty years or so in the British Scientific Instrument Research Association, and for a dozen years he has been the head of it. He has therefore had close contact for all that time with instrument shops, and has been right through the recent war in contact with many war developments, which included machines for the making of munitions and developments in instruments that actually became weapons. The work he has had to do, in connection with the war especially, has taken him to innumerable factories, and probably his position in the instrument industry is on that account quite unique: there cannot be anybody more fully informed. I call upon Mr. Philpot to read his paper.

The following paper was then read:

It may well be that the title of this lecture is somewhat misleading. If the emphasis in the title is on the word "making", then you might fairly expect to hear something of the way in which the precision of instruments has been increased in recent years, through the development of improved methods of manufacture and by the employment in the processes of manufacture of machine tools capable of achieving a greater degree of accuracy of working than was possible in the past. I have, however, too great an admiration of the skill of the old craftsman lightly to suggest that the higher standard of precision measurement which exists to-day has been made possible through the good offices of the machine in making good the deficiencies of the man. A kindlier view is that the marvel of the modern machine tool lies in its ability to achieve great speed of working without sacrifice of the craftsman's accuracy. In any case, I am not a production engineer and would be but a poor guide in the machine shop, as may be only too apparent from these opening remarks. It can, however, I think, be fairly said that the major factor in the development of modern precision instruments is not to be found in an enhanced precision of manufacture, but in the devising and utilisation of methods whereby existing accuracy can be more fully exploited. It is this aspect of the matter which I wish to bring before you this afternoon, not only because it has been a striking feature of recent progress in the making of precision instruments, but, quite frankly, because my interests lie in that direction. We have been living in a great era of application of scientific knowledge and perhaps no better example can be given of the efficiency of that application than that furnished by recent improvements in precision instruments and by the conversion into precision instruments of devices not formerly considered to be very precise in their working.

It is quite true to say that, until fairly recent times, the natural home of the scientific instrument of precision was the laboratory; its only user the man of science. For a very long time its existence was a cloistered one—it was tenderly treated and comfortably housed. When not in use, it reposed in a case of aristocratic wood with trappings of velvet. The incursion of science into every phase of life and, particularly, the embodiment of advances in scientific knowledge in the creation of new industrial processes, have thrust many types of instruments into a more robust

environment. The avid demands for the products of manufacture and the growth of industrial competition have had their natural sequence in the development of methods of mass production, and this, combined with a stiffening of the requirements of the purchasing public in the directions of standardisation and uniformity of product, has meant that these instruments must be instruments of precision. During the recent war, men and women from every walk of life, with or without scientific education or training, made daily use of precision instruments, both in the factory and in actual conflict in the air or on the sea and land, and obtained thereby that satisfaction which comes from the achievement of fine accuracy. There are still master instruments of precision, which provide a standard of performance for precision instruments in general, which must be used under specified and special conditions and operated by highly-skilled persons. Such instruments are appropriately housed in the scientific laboratory. This afternoon, however, we shall confine our attention to those precision instruments which are in general use and which play a most notable part in modern life.

I have already remarked that a feature of the modern precision instrument is the degree of exploitation of the available accuracy. This increased use of accuracy has been obtained, in general, by the conversion, through the application of some scientific principle, of a small effect into a large effect and by achieving this magnification whilst faithfully retaining the characteristics of the small effect. The large effect is capable of being observed and handled, as it were, with a facility which was impossible whilst the effect was small. Perhaps the modern radio set provides a parallel in this matter. One does not need a high sense of proportion to realise that the power reaching any one aerial situated, say, one hundred miles from a broadcasting station cannot be anything but minute. The old crystal set, with its earphones, provided a measure of that power. The effect could be registered, it is true, but only in an environment of silence. The application of the knowledge of that branch of science known as electronics has, in the modern wireless set, resulted in a device whereby the small input of power is amplified many thousands of times. The added power is drawn from the electric mains—the system of valves in the wireless set enables the amplification to take place and ensures the faithful reproduction of the original characteristics. To make measurements of characteristics of the original small radio effect might be difficult or impossible. To do so on the amplified effect is relatively easy. Let us consider some examples of the way in which magnification or amplification of some kind or another has increased both the utility and the obtainable accuracy of some types of precision instruments.

The precision of any instrument designed to measure angles is dependent upon the mechanical perfection of the instrument and upon the minimum angular change which it is possible to observe with accuracy. If the former is perfect, the degree of precision will be governed by the latter. Until fairly recently the usual type of reading scale employed was a metal one, preferably of silver, divided into 360 degrees, each degree division being sub-divided into three of 20 minutes each. By means of a vernier attachment, each of these smaller divisions was effectively divided into 60 parts, so that an angular difference of 20 seconds of arc could be measured. If a greater degree of precision were required, the obvious course was to reduce the equivalent angular value of the sub-division. This could be achieved either by

increasing the diameter of the circle and thus permitting more divisions of the same width to be included around the perimeter or by the engraving of more lines on a circle of the same diameter. Now whilst the former method is quite convenient in an instrument which can be set up permanently in one place, as is possible in laboratory use, it has grave disadvantages in a portable instrument, such as a surveying instrument, which has to be carried from place to place. In these circumstances, neither size nor weight can be unduly increased. If, on the other hand, an attempt is made to achieve greater accuracy of reading by squeezing more and more lines into the periphery of a metal circle, it will be found that little progress can be made by this means. The more narrow a division, the finer must be the lines bounding it, if accuracy of reading is to be maintained. The finer the lines the greater must be the magnification with which they are observed. In a portable instrument it is exceedingly difficult to illuminate the surface of a metal scale—probably tarnished and almost certainly covered with fine scratches through periodic cleaning—in a manner which will permit a clear highly-magnified view of a scale to be obtained. This is an old-standing bugbear of the use of metal scales. But, apart from this, a line engraved in metal is not of a nature to permit of effective high magnification. In engraving a line in a metal, a burr is thrown up at the edge of the line. This burr makes the edge of the line indefinite and so it is carefully cleaned off. In spite of the greatest care, however, the sides of the burr are pressed back into the space of the division so that some indefiniteness of boundary is retained. The actual position of the line may well, in consequence, be indeterminate to within, say, half the width of the line. Magnification will merely make the defect more apparent.

With the introduction of glass as the scale material, not only have the difficulties already mentioned been overcome, but a marked advance has been achieved in precision of measurement. Readings can be made by transmitted light instead of by reflected light and, in consequence, ample illumination can be provided for any magnification system; a scale on glass can be read with a compound microscope giving a magnification as high as 80. Lines on glass, whether they be ruled with a diamond point or produced by one of the graticule etching processes, have much better definition of edge than have lines ruled on metal. Moreover, finer lines can be produced on glass than are possible on metal. The advantages of magnification can, therefore, be realised when reading scales ruled on glass. The scale can be of relatively small dimensions, and can, in consequence, as is the case in modern theodolites, be enclosed within the body of the instrument. Great saving has thus been effected in weight. A Primary Theodolite having silver circles of 12 or more inches diameter, read with micrometer microscopes, might well have weighed 70 or 80-lb. An Optical Theodolite of the same accuracy will have circles of $4\frac{1}{2}$ inches diameter and an overall weight of 12-lb. Time will not permit of a description of the ingenious optical systems employed in an optical theodolite, although these would well repay study. It will be sufficient to mention two results of these systems. Given adequate illumination, it is possible to produce an image of a scale in any convenient position by optical means; in an optical theodolite scale regions at opposite ends of a diameter appear simultaneously in the field of view of the one reading microscope. The user, therefore, is not required to walk round and round his instrument when taking observations. In the second place, it is possible to produce in the field of view of the

reading microscope a display of scales which allow degrees, minutes, seconds and even half-seconds to be read off directly. Some idea of the precision of such an instrument can be gained from the realisation that one second of arc is the angle subtended at the eye by a halfpenny at a distance of three miles. The introduction of optical scales into measuring instruments has made it possible to exploit to a greater degree the inherent accuracy of the instruments by the employment of optical magnification.

It has been said that, on psychological grounds, mechanical precision is influenced by the selection of the unit of precision, and that continental workers wedded to the one-hundredth of a millimetre have had an advantage in this respect over British workers for whom one-thousandth of an inch—the ubiquitous “thou”—has provided the norm (a thousandth of an inch is two and a half times as long as a hundredth of a millimetre). If this be true, the selection of the wavelength of light, one fifty-thousandth of an inch, should have a tonic effect on precision measurements of length, and, in fact, greater use is being made of the principles of interferometry, in which inherently the wavelength of light is the unit, in the design of certain precision instruments. In one sense, an interferometer can be regarded as a length magnifier. Anyone familiar with an interferometer will know that if one of the mirrors used in the system be tilted through so small an angle that one edge of the mirror moves backwards through no more than a quarter of a wavelength, and the other edge of the mirror moves forward through the same distance, then two straight dark bands will appear in the field of view of the interferometer. These bands may well be two or more inches apart so that a movement through a distance equal to a quarter of a wavelength of light—one two-hundred-thousandth of an inch—has provided a scale division two inches in width. This self-evidently represents a high order of length magnification. The glass worker in an optical instrument factory makes use of this magnification. By its means he can assess the curvature of a lens into a region far beyond that into which he can go by the use of a mechanical instrument such as a spherometer. By making contact between his lens and a test plate which includes, by hand-working, the exact reverse of the curve he wishes to give to his lens, any differences between the two curves are revealed by interference bands, and by this method any errors are magnified in the degree indicated above. Also his finished lens can be tested by him on an interferometer with the same amazing degree of precision. It is not surprising that in view of this and of the fact that, contrary to common opinion, the interferometer can be used by an artisan, that the instrument has become a tool of precise measurement. One need only mention the interference gauge comparator, by means of which gauges can be tested for linear accuracy. Any difference in length of the gauge from that of a master gauge, arising through wear, is revealed by a displacement of the bands in an interference pattern; any departures from equality are subjected to the high order of magnification which is associated with interference phenomena.

If any reflecting surface is included in an interferometer system, the bands which are seen are only straight if the surface is accurately plane. Any departure from planeness is revealed as a divergence from straightness in the bands, and in consequence the interference pattern plots out the contours of the reflecting surface. Here there is evidently the basis of the precision measurement of the quality of a

surface and this phenomenon is utilised in an instrument such as the interference microscope, by means of which any irregularities in a surface are revealed by the distortion of an interference pattern.

It is probably true that there still exists in many people's minds an idea that the use of the interferometer requires great skill and erudition. It cannot be too greatly stressed that the phenomenon of interference is one well adapted to practical use, and that the attainment of greater precision in linear measurement, even under manufacturing conditions, may well be markedly advanced by the growth of a general appreciation of this fact. In optical works interference is handled as an everyday phenomenon, and there is no reason why it should not be utilised elsewhere to a much greater degree than it is.

MAGNIFICATION BY CONVERSION

There is, as has been remarked, a growing tendency to increase both the ease and precision of measurement by converting a small effect to be measured into a different type of effect of much greater magnitude. The use of instruments in industry in connection with industrial processes demands something more than the mere measurement of quantities. The purpose of the measurement is to determine whether the physical conditions required for the successful carrying out of the process are being maintained. If the measurement reveals that there is a departure from the optimum conditions, it will obviously be of great advantage if the effect being measured is of such a nature and of sufficient magnitude to be able, of itself, to provide the source of power needed to "trigger" the mechanical operations, such as the opening or closing of valves, which will restore the correct conditions. Magnification by conversion is therefore doubly beneficial; not only does it add to the ease and precision of measurement, but it enables the measurement itself to exercise the function of control. One interesting example of this method of measurement is that which employs conversion into pressure. If we have a chamber into which air is being driven under pressure through an orifice jet, and if, at the other end, the air escapes from the chamber through a second jet, the pressure inside the chamber will depend on the relative sizes of the two jets. A large exit jet will allow a small pressure inside the chamber to force the air out of the chamber at the same rate at which it enters through the first jet. If the exit jet is restricted, the pressure inside the chamber will rise. This restriction can be effectively brought about by bringing the surface of, say, a metal plate close to the exit jet. If both the surfaces of the jet and of the plate are truly plane, the chamber will be sealed when the two come into contact and the flow of air will cease. The pressure inside the chamber will then become equal to that used to drive air into the chamber. As the plate is withdrawn from the jet, the pressure inside the chamber will fall and this fall of pressure will provide a measure of the distance through which the plate is moved. Length has thus been converted into pressure. The change in level of a manometer registering the pressure inside the chamber may be many thousand times the extent of movement of the plate which has caused the change in pressure. Here, then, is an obvious aid to precise measurement, of which advantage is now frequently taken in the design of measuring instruments. The method can be employed for rapid and accurate gauging. Let us consider, for the sake of simplicity, a rectangular block,

the dimensions of which are required to conform to some rigid specification. If a master block is placed on a table so that its top surface is close to the exit jet of an instrument, incorporating the device described above, a certain pressure will be registered on the manometer. This will be the standard pressure. If the block to be tested is now substituted for the master block, any departure in dimension from that of the master block will cause air to escape from the jet either less or more freely, and the manometer level will vary accordingly. The magnification ensures the precision of the measurement, the method itself embodies simplicity and does not require skilled operation.

The same principle is applied to instruments designed to record and control relatively small pressures. If a capsule is bounded by two diaphragms, a small pressure applied to one diaphragm will cause a small movement of the other diaphragm. This small movement can be transmitted to the end of a lever, to the other end of which is attached a small plate with a polished, optically flat surface. If this surface is situated just above the exit jet in the system we have been considering, it is evident that the application of the original small pressure will cause the distance between the plate and the jet to vary and, in consequence, cause a relatively large change of pressure to be recorded by the instrument. By means of such an amplifier small variations in pressure of from 0 to 0.3 mm. of mercury can be converted into a range of pressure of from 1 to 5 lb. per square inch, thus providing an extended scale of measurement and the practical means of exercising control.

Lastly, the device can be used for the conversion of small temperature changes into relatively large pressure changes. If the plate over the exit jet be affixed to the end of a cantilever, its position relative to the jet will vary as any constant pressure is applied to the cantilever at different points along its length. It is not difficult to arrange that the position of a galvanometer needle shall determine at what point pressure provided, say, by a spring is applied to the cantilever, and, in consequence, the deflection of the galvanometer directly affects the rate of flow of air and, in consequence, the recorded pressure. In an instrument of this type the small voltage provided by the use of a thermocouple may well be converted into a pressure of 5 lb. per square inch—to the great advantage of the measurement and control of temperature by thermo-electric means.

An ingenious application of magnification by conversion is seen in an instrument which has recently been developed in which small changes in linear dimensions are converted into changes of frequency. In the production of steel strip, after the main rolling has taken place, a final "temper pass" is given to the strip through a mill in order to produce a regulated amount of work hardness. The reductions produced in the thickness of the strip in this final process are of the order of a quarter per cent. to one per cent., and, in the case of strip of one-hundredth inch thickness, the achievement of this requires that changes of thickness of 0.000025 inch shall be precisely measured. This measurement has to be carried out on a moving strip which may be travelling at a speed as high as 1,000 feet per minute. Advantage is taken of the fact that a reduction in the thickness of the strip during rolling is accompanied by an increase in the length of the strip and in consequence the strip leaves the mill at a greater velocity than that with which it enters. A small generator is coupled to the mill drive, and produces an output having a frequency proportional

to the rolling speed. This output is applied to two electromagnets, one of which acts on the strip before it enters the rollers, and the other after the strip has left the rollers. The magnetisation of the strip thus produced affects two pick-up units, one set at a fixed distance from the second electromagnet and the other at a distance from the first electromagnet which can be slightly varied by a micrometer arrangement. If the distance between the second pair is, say, 10 inches, and the distance between the first pair is set at 9.9 inches, the output from the two pick-up units will be in phase when the strip is leaving the rollers one per cent. faster than it entered. The outputs from the two pick-ups are fed into a phase-indicating instrument and the procedure followed is to adjust the rolling load and other conditions until a balance is obtained, indicating phase equality, when the micrometer is set to the required percentage of reduction. In this case, the variation in length of one-hundredth of an inch is transferred to a length of 10 inches and this magnified linear measurement is given precision by the employment of a sensitive indication of phase change.

MAGNIFICATION BY ELECTRONICS

One of the main purposes of electronic devices is to amplify small electrical effects whilst retaining the precise characteristics of the small effects. Since it is possible to convert almost any physical change into an electrical effect, it is not surprising that devices of an electronic nature have been largely used to produce the magnification for measurement purposes which we have been considering. There are a very large number of instruments in which use of electronics has been made to this end and it is only possible to consider two or three of them. The incursion of electronics into instrument design has been a most effective one, but is still in its comparatively early stages. There can be no doubt that the immediate future will witness striking advances in this direction.

The thermocouple is probably the device most commonly used in industry for the measurement of temperature. Over the ranges of temperatures which are required to be measured in practice, the voltage output of the thermocouple is relatively small, and in consequence a sensitive recording instrument has to be employed in order that the scale corresponding to the range of temperature may be wide enough to allow of accurate reading. The use of an instrument of such delicacy as a sensitive galvanometer does not commend itself to the industrial works user and is ill-suited for control purposes. By means of transformer systems, alternating current can be amplified with facility, but the amplification of direct current presents a difficult problem. Electronic devices, however, make this possible and the direct current of a thermocouple system is to-day amplified in thermocouple indicators and recorders to an extent which permits the use of robust recording instruments and of control systems. The galvanometer spot and scale is a familiar feature of every laboratory, as is also the difficulty of accurately reading small changes in the position of the spot. If the spot of light is given a line form, and if the line of light be allowed to fall on a slit placed in front of a photo-electric cell, a current will pass through the photocell. If the slightest change occurs in the galvanometer deflection, the amount of light entering the photocell will vary and hence the current passing through the cell will change. In other words, the photocell becomes more or less conducting as

the line of light approaches or departs from coincidence with the slit. Changes in conductance can be one of the powerful operating effects in electronic devices, and particularly in producing changes in phase. Changes in phase markedly affect the output of such devices as Thyatron valves and, in consequence, a small change of galvanometer deflection can be magnified into a large change of valve output. The amount of power which has thus become available through a small change in a galvanometer deflection, which in itself results from a small change in temperature, not only makes it possible to use a more robust and less sensitive type of galvanometer, but provides a means of exercising the control necessary to correct change in temperature.

Reference was made earlier to the interference microscope as a means of appraising the degree of smoothness of metal surfaces. The possibilities of the use of electronics have enabled a very sensitive mechanical instrument to be developed for measuring surface roughness, which will detect irregularities in a surface which are no greater than one-millionth of an inch. A stylus with a diamond point of very small radius is drawn across the surface to be tested and moves up and down as the point traverses the "hills" and "valleys" of the surface. This up and down motion is made to modify the distance between the plates of an electrostatic condenser and hence to vary the capacity of the condenser. Variation in electrical capacity is one of the effects to which electronic devices are extremely sensitive and, in consequence, it is possible to translate the minute up and down motions of the stylus into electrical effects of sensible power. By such means the motions of the stylus can be reproduced in a highly accentuated form in the movements of a recording pen on a chart, and magnifications of 100,000 and greater can be provided. It is thus possible to obtain information of the quality of a surface, to all appearances perfect, which may be invaluable to the engineer and which may be directly related to the performance and life of, for example, the internal combustion engine.

Electronic devices are playing a notable part in the science of exact measurement, and there can be no doubt that their impact on measurement will continue to grow in effectiveness. The examples given above are but two of a host which could be cited, and it must suffice to mention the part which electronics has played in the measurement of time. For centuries the pendulum has provided the local standard of time and the rotation of the earth about its axis, the ultimate standard. It can be said with some truth that nowadays in many respects the electronic time-indicating and time-recording instruments supersede the pendulum and serve as a check on the time-recording properties of the earth. The piezo-electrical quartz crystal oscillator provides an amazingly constant means of measuring time and is sensibly independent of conditions. On account of the very low thermal expansion of quartz the frequency of a quartz oscillator is not sensitive to small changes of temperature, and the device is free from dependence upon the value of gravitational force. A standard form of quartz oscillator has a frequency of 100,000 cycles per second, so that, through its use, the possibility evidently exists of the measurement of very short time intervals. An electronic system can be so designed that when a train of electrical pulses having a frequency of, say, 100,000 cycles per second is imposed on the system, each individual pulse produces an individual effect which can be isolated. There exist to-day electronic instruments which, when a train of high

frequency pulses is fed into them, record the exact number of individual pulses accurately. Since the unit of time involved is one-hundred-thousandth of a second, it will be appreciated that such instruments provide the means of the most precise measurement of intervals of time. Electronic devices can be designed which have the property of accepting or rejecting pulses according to the sign of the electrical effect. Through this property, it is possible to step down the frequency of a train of pulses and in doing so to retain the original degree of accuracy of the quartz crystal oscillator producing the train. This stepping down of frequency is most easily achieved in factors of two but more recently a factor of ten has been found possible. The time interval of one-hundred-thousandth of a second can thus be stepped up by progressive factors to a much longer and more manageable interval of time, and it is by making use of electronic circuits having this property that the quartz crystal clock functions. The accuracy of such clocks is almost beyond belief—their absolute error may be as low as ± 1 part in 100,000,000. Reference has been made to the rotation of the earth as providing the ultimate standard of time, but with the aid of quartz crystal clocks instantaneous perturbations of the speed of rotation of the earth can be detected and measured.

As I remarked at the beginning, this paper has probably not taken the form which the title might at first sight have indicated. I thought, however, it worth while to draw attention to the tendency which exists to-day to achieve precision of measurement, not by straining every means to measure smaller and smaller differences in the magnitude of some physical effect, but by employing the variation to be measured to produce much larger variations in some other physical effect. The magnification of inaccuracies is, of course, useless, as is also inaccurate magnification. The object of the modern instrument designer is to ensure that the original effect gives a true indication of the phenomenon under observation, and that the means he takes to magnify this effect in no way diminishes the validity of that indication.

The examples which have been given to-day may appear to have been chosen rather haphazardly, but that has resulted from the desire to include a variety of instruments. They have, I hope, given some indication of a particular trend in precision instrument design, which, in my view, will set the pattern of instrument development for some time to come.

I should, in conclusion, like to express my thanks to the many instrument firms to whom I am indebted for information on modern precision instruments.

DISCUSSION

Mr. E. W. M. HEDDLE: M.C., M.A., I have listened with very great interest indeed to Mr. Philpot's paper, and one remark—about the middle of the paper—that relatively untrained people might use precision instruments intelligently prompts me to record an experience I had in the early days of the war.

One of my jobs was to train in metrology various women from all classes to become inspectors in engineering firms in the Midlands. One of these firms with a great number of subsidiary factories was engaged in the making of fine gauges, and after one group of trainees had settled down in one factory, a Director later told me, the best one of that group was a girl who had developed a technique of her own and was not only more speedy in her work but her relative accuracy was very much greater than that of the others. The gauges made by that firm in some cases had the National Physical

Laboratory certificate, and so the tolerance was of the order of five-millionths of an inch. When I went back to college to review the records of this particular group of workers I found that this girl had given her age as 35, and her previous occupation as with a "Christmas cracker" firm. So it turned out that this "Christmas cracker" girl with a very mediocre elementary school education was better fitted for this particular job in industry than girls with secondary school educations.

QUESTION: May I ask your view, Mr. Philpot, about anti-vibration units, because it seems to me that when you come to very fine instruments external vibrations do play a very important part.

Mr. C. BOWDEN: Mr. Philpot made one or two remarks about surveying instruments in particular. I would like to ask him if any advances have recently been made in the use of radar techniques for surveying purposes. Most surveying work—the measurement of heights, and so on—is usually done by a system of trigonometry, and it appears to me that the very precise measurements which have recently been made by radar technique could quite well be applied with considerable accuracy to the measurement of heights, one of the advantages, of course, being that it could be done at night.

Mr. PHILPOT: As regards anti-vibration mounting, I think I should say that as long as there was a tendency—and I think probably there was such a tendency up to twenty-five years ago—to try to achieve greater precision of measurement by making apparatus of greater and greater delicacy, so the vibration factor became a progressively greater menace. There is one thing to be said about the present tendency: its achievement of a much greater robustness in instruments makes them likely to be rather more independent of vibration.

As regards radar for surveying, the obvious gambit for me here is to fall back on the Official Secrets Act, or something of that sort. It is obvious, of course, that in radar there is a possibility of great accuracy in the measurement of distance. Since, however, a large part of surveying is connected with relatively short distances, I do not think radar is likely, in the immediate future, to supersede to any extent the optical method. Perhaps Mr. Wilfred Taylor would say something on this matter.

Mr. WILFRED TAYLOR: Radar is already being used in one country for triangulation, and I think the snag at the moment is that in order to get the angular accuracy required, a sight of about 200 miles is necessary, so that it is on a very large scale, and these great triangles must then be broken down by optical means. So until further developments have taken place—which may not be possible—radar does not offer any very great threat to the surveying instrument.

Mr. P. GRODZINSKI: Mr. Philpot referred to the interesting new use of engraved glass circles. I had recently the opportunity of seeing one of these circles. They have a thickness of about half-an-inch. I think Mr. Philpot mentioned a magnification of eighty. That would be near the limit, I think. We were able to use a magnification of 120. I would like to ask whether it is absolutely necessary to have these glass circles so thick. A much higher magnification would be possible with a less thick circle, and this would make it possible to go to the limit of width of engraved line. If this could be very much smaller, this might secure higher accuracy of measuring angles.

Mr. PHILPOT: I should have thought that glass circles were made of rather less thickness than half-an-inch, but I have a feeling myself that, in spite of all I have said on the excellence of glass lines, when you are achieving a figure of 80 or 100 you are going to the limit of magnification that can safely be used. Even the best of lines would begin to look a little ragged if magnified too highly. I imagine the present practice is just about the optimum for rigidity, robustness and magnification.

QUESTION: In dealing with modern dividing instruments I have found that with some

of these on the market the scale is not completely accurately centred, so giving a periodic error. Has any method been found of getting greater accuracy in this?

MR. WILFRED TAYLOR: I should say that two types of instrument have been developed, one in which both ends of a circle diameter are brought simultaneously into reading. In that case the centering of the circle is not important and any errors are completely cancelled out. There is another type of instrument which is looked upon as a simpler and cheaper instrument, in which the centering is relatively much more important, because the circle is only read at one point. So one gets the anomalous position that in the most precise instruments centering is less important than in the least precise instruments.

THE CHAIRMAN: While listening to the paper, I grew convinced that the precision instrument is a flourishing branch of applied science in this country; we are therefore looking forward with confidence to the future of the precision instrument industry. Of course, there is going to be great international competition in the coming years. What form that competition will take precisely we do not know. It may be purely economic, or it might unfortunately become military. In either event, the application of science, and especially the application of instruments of precision in the engineering manufactures, will probably be the key to competitive success of a material kind, the key to maintaining our nation's standard of living, and perhaps the key to national survival. So that I think we may close this meeting by wishing Mr. Philpot the greatest of success in his mission of introducing precision instruments into British industry. I ask you, therefore, to approve a hearty vote of thanks to the reader of the paper.

The vote of thanks was carried with acclamation, and after a vote of thanks to the Chairman had been carried with acclamation, the meeting then terminated.

CRAFTSMANSHIP

(III) THE CRAFTSMAN AND DESIGN IN THE TEXTILE INDUSTRY

By ALEC B. HUNTER, F.S.I.A.

Eighth Ordinary Meeting, Wednesday, January 21st, 1948

SIR KENNETH LEE, BT., LL.D., *Chairman, Tootal Broadhurst Lee Co., Ltd., in the Chair*

THE CHAIRMAN: I am exceedingly sorry to say that Mr. Hunter is unable to be here this afternoon because he is not well, but we are very fortunate in having Mr. Goodale here and he has agreed to read Mr. Hunter's paper. Mr. Hunter has had very wide experience. He is one of the few practical craftsmen and a really clever designer, and I am sure you will find his paper of great interest. Without saying anything more I will now ask Mr. Goodale if he will be good enough to read the paper.

The following paper was then read:

In considering the design of textiles it is important to remember that we are dealing with an ancient craft, the essential character of which has not changed since the earliest times. Man has desired to decorate and then mechanise, and no other craft has given him greater opportunity to exercise his ingenuity.

In the loom, or weaving machine, there is a steady and continuous evolution through the centuries and the deft fingers of the power loom weaver of to-day part

the fine warp threads with the same skill as the weaver in Ancient China. Since the first weavers set their warp threads side by side and then contrived a simple form of heddle to separate the alternate threads, and so allow a passage or "shed" for the weft, one mechanism after another has been added to the primitive loom. The number of heddles was increased with the necessary treadles to control them so that more elaborate interchanges of threads could be made. The draw-loom was invented and developed so that single threads or small groups of threads could be controlled and repeating patterns woven. The draw-loom and heddles were combined with such fascinating and ingenious devices as the Pressure Harness Damask so that large designs could be woven with the great number of threads necessary to make the richest satins. Later came the fly shuttle whereby the weaver can throw the

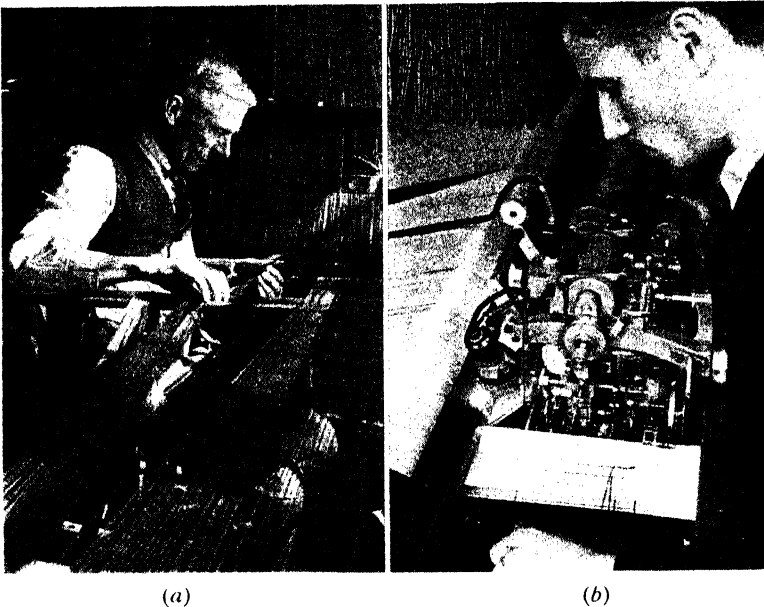


FIG. 1 (a) shows the preparatory process of twisting. Each end of the new warp is twisted individually to an end of the old warp, and there may be 15,000 ends in each warp.

(b) Shows the modern equivalent process, a warp tying machine.

shuttle with one hand to a box at each side of the loom instead of throwing and catching from one hand to the other. Then came the jacquard, which is the draw-loom in an improved mechanical form, enabling designs to be prepared for the loom and when woven to be changed more easily. At the same time came the use of water or steam power to do the heavy work, and now to-day great attention is being given to the precision making of the loom and the perfecting of its design.

¶ All these are single steps in the evolution of the loom. None of them is revolutionary, but one added to another stretches across the vast distance between hand plaiting of threads and the modern automatic loom. There is no essential difference. All the mechanisms are simply devices to achieve the infinitely various interlacings

of warp and weft threads with the greatest possible saving of labour. There is a long tradition of weaving and it is unbroken.

Mechanical improvements have made a greater sub-division of labour, and perhaps some less skill in manipulation. But skilled craftsmen are still required, particularly in the weaving of fine and elaborate cloths. There is a great difference between individual weavers and to watch one who is skilled with her sure, but unhurried, movements and her quick selection of one out of many thousands of threads is to realise that craftsmanship is robustly alive in the factory to-day.

While this is true of the finer cloths in particular it must be admitted that in general the more automatic a process becomes the less room is there for individual skill. The very sub-division of work limits the scope of the skill. Mr. Cottrell in a recent paper on automatic loom development says that the American seeks to take "the skill out of cloth production" although he adds that the "Swiss seems to be trying hard to retain it or at least to turn it into new channels". A recent report on German jacquard machinery speaks of the lack of modern equipment and adds that "the quality of their good-class figured goods is due more to the skill of the operative than any outstanding designs in machinery". The advance of the machine inevitably brings some decay in craftsmanship as we understand it.

It is therefore interesting and encouraging for us to note the considerable amount of hand-weaving which is still carried on in Great Britain as well as other countries. In the Hebrides there are some 1,500 hand weavers. These, with those engaged in the related carding and spinning processes, amount to 10 per cent. of those engaged in the whole woollen industry of Scotland. Mr. Sinclair of the Scottish Woollen Technical College, Galashiels, to whom I am indebted for information on the Scottish industry, points out that this hand weaving "must be regarded as a domestic industry on standardised production so organised because of the economic circumstances of crofting and fishing interruptions." They mostly weave traditional types of design which have been evolved on similar looms through many centuries. Elsewhere in Scotland there is hand-weaving on a smaller scale, and here it is mainly concerned with new ideas in scarves and shawls, playing with the infinite variations in wefting for which the hand loom is so well suited. The quantities required are small and there must always be the highest degree of novelty. These designs are developed in part by the weavers themselves.

Two good reasons have been given for this continuance of hand-weaving in Scotland: first the circumstances of life in the Isles which favour a home industry, and second the desire for small quantities of distinctive and original materials which the hand weaver can most readily meet on account of his skill in modifying and developing patterns and his economy in the setting up of the loom.

To turn to England, among the weavers of finer fabrics there were in Macclesfield, up till the outbreak of war in 1939, 70 hand-weavers fully employed in one works alone. They were engaged in the weaving of silk tie squares and were ready to weave as little as one square of 28 inches! Sometimes the weavers had their looms in their own houses in the garrets—a second-floor room with skylights. In accordance with the old custom of the industry the wives and children would fetch the weft and wind it for the weaver. The weaving of a small number of silk squares requires the adaptability of the hand-weaver. The machine need not be re-set: the touch of the

craftsman supplies at once the precision which can only be obtained by an elaborate changing of wheels on the machine.

Similarly in Braintree in Essex some 30 hand-weavers were engaged in the production of fine silk damasks, brocades, tissues and velvets. The older men well remember the time when some of the looms were in the weavers' houses where they were masters of everything to do with the loom, but in recent years they have all been within the factory. Some weavers specialised in one type of cloth, but most of them were able to weave the delicate brocade or the rich and heavy brocantelle or to cut the velvet pile with uncanny accuracy as it lies tightly stretched on the wire. All these men were most highly skilled craftsmen, inheritors of a great tradition and with that mastery of the craft which is the mark of professional accomplishment.

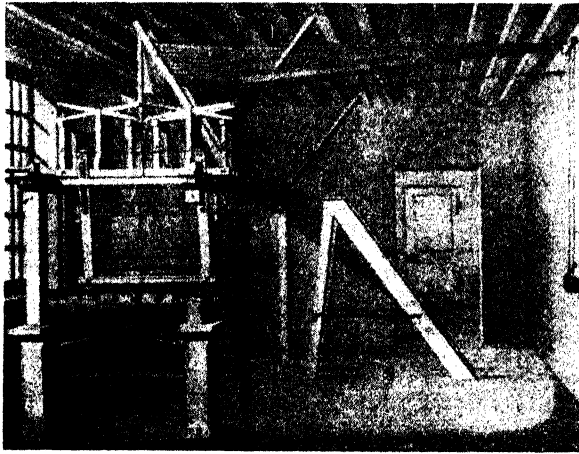


FIG. 2.—An English draw loom of the eighteenth century. The harness threads which control the warp threads can be seen and the Simple by which the Draw Boy controlled the harness threads is at the side.

In the weaving of these rich damasks and brocades the hand-loom can give a variety of design, texture and colour which could scarcely be achieved by machine production with its voracious appetite and greater subdivision of labour. Less perfect yarn may be used in the hand-loom and there is moreover a subtle quality in the material itself, which is an added reason for the continuance of this method. Changes brought about by each world war have sadly reduced the number of hand-weavers in both firms but it is good to be able to say that this work is still carried on and the skill practised. There are other weavers doing similar work but the two firms I have described are the largest of their kind.

It is not easy to find the right boys to train for this work nowadays, and when found it is not likely that they will learn from their fathers as was the sage custom in the past. I think it is important for the textile industry as a whole that this skill in weaving should be jealously maintained. There are other hand-weaving concerns in the country of which detailed mention cannot now be made. Among

them however are "designer weavers" whose work has been of great value and to which I shall make reference later.

Such is a brief description of the development of the craft and industry of woven textiles and of the continued use of hand methods to-day.

What I have said of weaving is mainly true of textile printing. Block printing is an ancient craft and is much used to-day. In the eighteenth century the engraved copper plate was used more and more, and the clear fine lines which were possible with engraving were used by designers with good effect, sometimes happily contrasted in the same design with the bolder quality of the wood block. The great craftsman, Oberkampf, creator of the Toiles de Jouy prints, who made his own designs, engraved



FIG. 3.—A figured power loom showing the jacquard control of the harness threads. The perforated cards which make the selection of the threads can be clearly seen

his own plates, cut his own blocks, organised his own factory, and ran his own business with great success, did much to develop this style with outstanding prints which bear the authentic mark of a technique fully understood. Towards the end of the eighteenth century the rotary principle was evolved for printing, and the engraved copper roller substituted for the flat plate which was so awkward to handle. The machine was an English invention, but Oberkampf was quick to appreciate and employ it. The principle of this roller machine has altered little since that time, and is the basis of the great textile printing industry to-day, although "surface" as well as engraved rollers are now used. Screen printing, which has been such a notable and recent addition to the craft, has its own technique which is largely new and still being evolved.

Hand block printing for which this country is so famous, remains an important part of the textile industry. There is a number of firms where the highest standards

of block cutting and printing are maintained. The nineteenth century saw a splendid development of the floral chintz, a manner which used all the quality of rich deep tones, the many colours and the scale of repeat, which the hand block method makes possible. The best designs show a proper understanding of the craftsmanship involved and there is a great demand for them from many countries. Printing of this kind needs a skill of a high order and the expert may detect the work of the individual printer in the final result. There is no other way of obtaining the same depth and variation of colour or of such an unlimited size of repeat in the design.

Block printing is also used for dress fabrics. At a works in the hills outside Macclesfield, you may be shown their finest productions—hand block printed squares on silk. Vegetable dyes are used, Indigo, Madder roots and Persian berries, for to this product everything of the best must be given. These productions, like hand-loom silks, are of their nature rare. There is value in the “limited edition”.

Frequently there is machine printing in the same works as block printing and almost always screen printing. This last is largely a hand process though it does not require the skill of block printing. The development of its technique which has made such strides in recent years still continues, but it has not that “craftsman” quality which is associated with the older methods. Nevertheless, it is of great value for producing shorter lengths comparatively cheaply and in consequence has given encouragement to the production of more experimental types of designs, for which cause alone its introduction has been of the first importance. Screen printing, moreover, like the hand block method, places no limit on the size of repeat of pattern or number of colours—a limitation which is inherent in the printing machine. Block printing of the simplest kind is used experimentally by designers and very widely in art schools. This is valuable work and will be referred to later.

Such is a brief description of the development of the craft and industry of textiles and of the continued use of hand methods to-day. It is evident that these survive on their own merits in spite of the great advance in the design and adaptability of the machine. Two reasons for this are particularly apparent. The first is to produce economically short lengths of original or unusual design or texture and the second is to produce fabrics of such rare richness and quality as would not be possible or practicable on a machine. These two reasons are closely inter-related. The handcraftsman produces small quantities in contrast to the mass production which is the logical consequence of machine methods.

I believe that such small quantity production is more than ever precious in this machine age. The fact that the quantity is small will probably mean that the material will be rich—though this is by no means necessary. It will, however, be expensive compared with the excellent machine productions, which may be available. Nevertheless, while delight in and desire for beautiful things remains, such production will be in demand because it is personal and individual, because it has a quality that cannot otherwise be obtained, or perhaps because it fulfils some unusual requirements or is designed for some particular setting. It may be that private patrons will be fewer but there remain our public buildings, churches, palaces, town halls and many others, which in every vital community should be adequately adorned and provide scope for the craftsman.

Is there any relation between this small and large scale production? I should point

out here that the distinction is not always clearly defined nor can any general rule as to quantity be laid down. A weaver of fine tie silks may speak of a power-loom quantity and have in mind 30 yards. Another weaver will not look at less than some thousands of yards. The quantity that is necessary for power-loom production has, I think, sometimes been over-estimated, and in some recent undertakings the facility for changing patterns and so gaining variety in machine production has not been fully employed.

But to return to the question of the relation between small and large scale production and how much one may influence the other. Hand-produced goods require the highest standard of quality in their making. The hand block print or the hand-woven silk tissue do, in fact, set such a standard—for it is the justification of their existence. They are as the Rolls Royce among engines. It is a good and even a necessary thing that some such standard should be set, although it is not necessary or even desirable that everyone should attain it, but being set it provides a landmark on which the larger-scale production can take bearings. I think there is no doubt it has a considerable and valuable influence in this way.

So much for the influence on quality. In the field of original design there has been considerable influence although hand methods have often been largely applied to some traditional style such as the floral chintz, where an obviously successful type and one well suited to the medium has been evolved. On the other hand I have spoken of the salutary effect of screen printing which has provided a most refreshing opportunity for experiment which has been boldly grasped. Individual hand-weavers have also contributed ideas and made experiments of great value which with the screen prints have had a considerable influence on the design of textiles for larger-scale production.

I believe, however, that a great deal more may be done by the conscious and deliberate use of hand methods in sampling for power production and it is to this aspect I now propose to turn.

It is sometimes useful to regard textile design as having two aspects. First there is the craft and technical approach which is concerned with the very nature of the fibres, the way they are spun and the way the yarns interlace in the cloth. It is concerned with the material and the machines and is three dimensional. The second is the surface pattern which is two dimensional. These two aspects appear in all patterned textiles and in the noblest are inseparable. Sometimes one predominates, as the three dimensional aspect in a dobby woven fabric, and sometimes the other as the two dimensional in a chintz. These two lines of approach exist to-day as they did in the past. Those who contribute to the former are either craftsmen or designers with a technical training, who are in close touch with a weaving or printing plant—most probably working in a mill and in daily contact with the yarns, processes, machines and the people who operate them. Unless they have such contact they cannot make use of the latest developments in materials and machines.

The surface pattern designers are often independent of the Works and although they may have picked up a fair working knowledge cannot be reckoned technicians or craftsmen. Sometimes their main activity is painting which is of course akin to purely surface pattern in a textile. Sometimes one person may deal with both aspects

and the result can be a splendid fabric. Too often, however, the one mainly concerned with the three dimensional approach keeps too close to his work and cannot see the wood for the trees. It is then that the painter-designer with his experience in other fields and inspiration from other sources can bring refreshment and vitality to the surface pattern. Very often such a designer has worked closely with a sympathetic technical counterpart and beautiful fabrics have been produced which have been a great contribution to the sum of textile achievement. This has been done in recent years, but it has also been a successful practice in the past, such as in France during the late seventeenth and early eighteen centuries. It should be remembered that this success depends a great deal on the capacity of the designer technician to re-create the painters' pattern in its appropriate form. This is true even of screen printing in which so much of the work of painter-designers has been produced. In its best form this method has worked well: in its worst it means buying an indifferent design

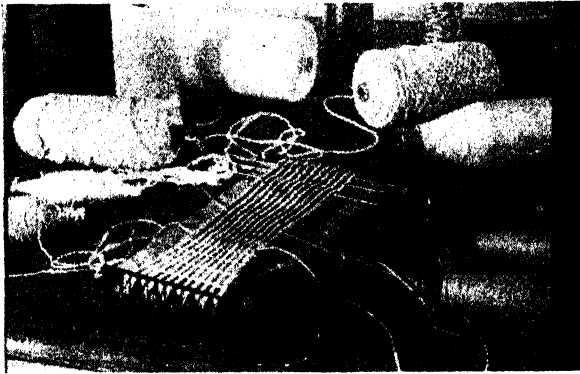


FIG. 4.—A very simple card loom devised by Alastair Morton, used in sampling for machine production. The weft is threaded by hand into the required intersections. The picture shows the various yarns which can be used and suggests the inspiration that may come through letting the design grow out of the handling of the yarns

which would do equally for a wallpaper or a tapestry and sending it with a piece of borrowed cloth to a card cutter in the hope that some saleable cloth may result. It is this last practice which produces so many of the unpleasant cloths we see to-day.

The aspect I would stress in this paper is that of the craftsman-designer. In many fields the drawing board designer holds too strong a sway to-day. Somehow the Drawing Board and Industry have been exalted on a pedestal as a symbol of the age. I can only speak for textiles but in this field I do not think it the symbol of an abundant harvest.

I have emphasised that the modern highly-mechanised textile industry has its roots in the ancient craft and to-day, I think, it is true to say that textile designers are realising more and more that it is out of these roots and from the materials themselves that creative design must spring.

Ernest Jackson—that master of drawing—would insist in lecturing to his pupils that "All art is related to touch". He would speak of Michael Angelo's fresco of the

Creation of Man and point out that God the Father is represented as creating Adam by the touch of the finger. The dormant body is brought to life by the simple touch. This is the symbol of the craftsman creating his fabric. The touch of the fibres, of the spun yarns, of wool, silk, cotton, flax or the many forms of rayon; the touch of the threads on the loom and the feel of the "beat up" of the weft. In the handling of the yarns and the weaving of the cloth the craftsman sees his design grow and take on its final shape. It is by touch that the really new designs are made.

William Morris understood this. So much is written and spoken of his work that I can add nothing here. Among his followers I would recall the work of my father, Edmund Hunter, who began as a free-lance designer of wall papers. Some fifty years ago he sensed a futility in selling the paper designs to an unknown producer and he decided he must weave himself. He set up looms and began to weave his own

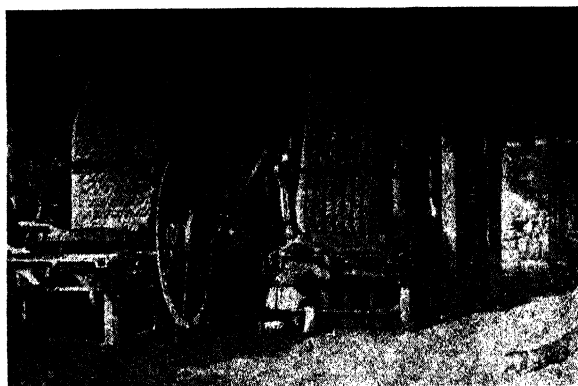


FIG. 5.—A copper roller machine of 1785. The main characteristics remain unchanged in the modern machine of this type

designs as a master craftsman. His work changed its character and he found the quality he had been seeking. Later he developed power-loom production beside his hand-loom.

Professor Walter Gropius, whom this Society recently created an Honorary R.D.I., and who is so concerned with machine production, preaches and practices the same idea. The "Bauhaus" he says "represented the school of thought which believes that the difference between industry and handicraft is far less a difference due to the nature of the tools employed than of the effect of subdivision of labour in the former and one man control from start to finish in the latter. Handicrafts and industry must be understood as opposites *perpetually approaching* each other. Handicrafts are now changing their traditional nature. In future their field will be in research work for industrial production . . .". At the same time he insists that the designer craftsman who is working in this way shall be "fully acquainted with factory methods of mechanised mass production", or he will only produce an "illogical machine-made imitation" bearing the stamp of a "make shift substitute".

More and more in recent years sampling for power-loom production has been done on hand-looms. For some years my own design staff have had a series of sample hand-looms corresponding exactly to each type of jacquard power-loom. They have amply proved their value. There are designers whose main creative work is in the loom itself with little, if any, preliminary work on paper. Some of these have full knowledge of the power-looms which will eventually weave their designs and are in the closest touch with the responsible technicians. Of those working in this way in this country I would mention Alastair Morton, Theo Moorman and Marianne Straub. Also Margaret Leischner whose work has a peculiar interest in that it is largely concerned with the production of "fancy" yarns with unusual twist



FIG. 6.—*A rubbing from the roller of one of the colours from a print of the early nineteenth century*

and texture. The craft approach of these weavers has enriched modern design a great deal and I believe will do more so in the future. There are others working in this way in other countries and among these I would mention Elsa Gulberg in Sweden and Dorothy Liebes in America.

The hand-loom used in this way is also of the greatest value in the training of designers for mass production. It has been so used for many years and I hope this method will be developed to a much greater extent in art schools in the future. Too often, however, where such looms have been installed they have been little used and successive generations of students have seen the same faded and dirty warp waiting for the magic touch which will never come. If these looms are to be of any value at all the warps must be continually changed with varying sizes and twists of yarn, rates of ends per inch and colours. There must also be the greatest variety of weft yarn.

In this way the sense of touch and of adventure will be cultivated but it must all the time be related to industrial needs and the exacting technical discipline which

this requires. It may be of interest to note in passing that the hand-loom is used for the training of weaving operatives for power-loom—even for automatic looms.

I have spoken a great deal about weaving in which my own work mostly lies. I believe what I have said is largely true of printing. Much useful and interesting experimental work has been done in block printing, but I believe a great deal more could be done. There is not at present the close relation between the hand printer designer and the machine as there is with the hand-loom designer I have described. Too much work of this kind by designers and students in art schools depends on the happy accident and not enough on the skill of the Craftsman.

I hesitate to speak emphatically on a subject I have not explored or worked on to any extent, but I wonder whether it would not be possible to devise some hand machine on which the designer-engraver could experiment in copper roller printing. The prints of the late eighteenth and early nineteenth centuries suggest the craftsman's use of all the technical possibilities of the material—a quality which is lacking in many modern prints. If some such small-scale machine could be devised the designer might regain that sense of touch which I suggest can be the revitalising force in design.

In this paper I have endeavoured to indicate the relation of hand to power production in the past, the present and the future.

In recent years a healthy and refreshing simplicity has been the character of much of the best machine design. It has come as a soothing draught after so much outworn ornament has been rehashed without regard to its original subtlety. We may now desire to go forward from our simplicity to a greater richness of design and texture; a greater variety of manner; something that will not only calm but also delight and exalt the senses. All this can, I believe, be given in the power-produced textiles of the future if the roots of the industry are remembered and the designer remains a craftsman—touching the materials with which he will create his fabric.

DISCUSSION

THE CHAIRMAN: It is customary at these meetings for the speaker to answer questions. Mr. Hunter is not here but Mr. Goodale has said that he will be only too willing to try to answer any questions that may be put to him.

Mr. ANTHONY S. HEAL: Mr. Hunter referred in his 'paper to the' importance of touch in the design of textiles. What is most noticeable in connection with printed textiles as opposed to woven textiles is the very great effect that the outside designer has had on the printed textile, an effect which is denied to woven textiles, because the printing is a more difficult job requiring technical training. Does Mr. Goodale see any remedy for this? From my own limited experience the more complicated and expensive woven fabrics are, the poorer is their range of designs.

Mr. GOODALE: The point which the speaker makes is a very real one but I think that the solution of it lies in a much closer co-ordination and integration between the art schools and technical colleges. I know that the Council of Industrial Design have that very much in mind. There has, unfortunately I think, been perhaps an understandable reluctance in the past for the two types of school to come together, but I think we can look upon that as a past misfortune and look to the future for a greater integration between the two, which will enable the students for woven fabrics to get that technical knowledge which is so essential in the creation of a beautiful woven fabric.

QUESTION: I think it would be interesting if Mr. Goodale could perhaps elaborate the

point made in the paper about the use of a rotary machine for printing on a small scale. Will it be possible to have something like that in art schools?

MR. GOODALE: That is rather an awkward question for me to answer because it concerns Mr. Hunter's own suggestion. It is obviously something which has got to be worked out. Mr. Hunter has taken the analogy of the simple hand-loom for the practical weaver designing for the power loom and poses the question whether there is not some simple method of trial engraving for machine printing. I think that with most inventions you have first to state the need and then someone will come along with the solution and I hope, for the speaker's sake, that such a person will come along very soon.

QUESTION: I wonder if Mr. Goodale could explain whether greater skill is required for block printing than for screen printing.

MR. GOODALE: That is going into the technique of printing, but the block printer has an apprenticeship of seven years and great skill is needed in the correct laying of the block. There may be as many as six blocks for each colour to one repeat of pattern and the skill lies in laying a particular range of colour blocks one over the other in exactly the right order and the right place. It is not easy. Whereas the screen is usually made to cover one repeat of the pattern across the whole width of the fabric, and two people, not necessarily skilled, but two ordinary people can squeegee the colour through the screen right across the cloth and back again. The screen is then lifted up, carried along on rails at the side of the table and dropped into the next position which is automatically set beforehand. The difference in the two skills lies in the block having to be correctly placed in the one case and the automatic position of the screen in the other.

SIR THOMAS DUNLOP: May I address to Mr. Goodale a broader question? How does America stand to-day from the point of view of craftsmanship and design in this industry?

MR. GOODALE: It is quite a big question as the speaker will appreciate. Mr. Hunter, in his paper, does mention the hand-loom weaving done by Dorothy Liebes in America. I met her this last summer. She has been doing in America a little of what other hand-weavers have been doing over here. There is another firm in New York which produces some very fine fabrics by hand-weaving. They are an offshoot from Italy. But I would say that in America there is a greater accent on the mass-produced material by machine than on the production of smaller quantities of fine quality materials. The latter production still rather belongs to weavers over here and on the Continent. The Americans tend to look to the European Continent including this country for the specialised type of materials they want and rely upon themselves for the production of medium, and for the most part inexpensive, fabrics produced in the mass. That, I think, would apply particularly to the furnishing trade and to some extent to the dress trade. They still look to us for tweeds and to this country and the Continent for silks and fine chintzes and other specialised types of furnishing materials. When the American gets going he likes to think of nothing less than 100,000 yards to a run while we go in for smaller runs.

THE CHAIRMAN: Perhaps I might just add this. My impression about America is that they are further advanced in printing than in weaving. They have got some very good designers in America in the printing world and they have made more progress because they like quantity and you can print quantity better than you can weave special goods.

QUESTION: We have already heard about the collaboration between the printer and the two dimensional designer. Could Mr. Goodale say something about what steps the designers take to make sure that their product is going to be practical to use for the purpose for which it is designed? I am thinking essentially of furnishing fabrics because we have recently had experience of 30-in. designs being printed on 36-in. material. We also get designs which do not run anywhere near straight with the weave of the cloth which also means mis-matching. It seems to me that these sort of points need to be studied along with the question of marketing.

MR. GOODALE: The point the speaker raises of 30-in. designs on 36-in. material is

unusual and is largely the result of having to use Government surplus cloths after a war. You cannot blame the designer.

The other point is a different one. In weaving there is close co-operation between the designer and the textile producer. I think there could be in printing, particularly if the hand method of trying out engraving could be introduced and worked up.

QUESTION: Can Mr. Goodale tell me why there is not a closer association between the producers and the art schools? The art schools are producing designs which are not workable and industry takes no notice although it is from that source that they will eventually draw their designers.

MR. GOODALE: That is another point which is being taken up—a closer working between industry and the art schools. I think that the art schools must also remember that most of the students in art schools will never be designers. There were at one time before the war something like 80,000 students in art schools in this country but there are not places for more than about 80 new designers in the industry a year. Please do not take those figures as necessarily correct but it is a fact that the number of first-rate designers to be absorbed in the textile industry is relatively very small. Therefore I think that many of the pupils in art schools will ultimately become members of a discerning public in the buying of well-designed things.

A close liaison between industry and art schools is necessary and at the present time it is being promoted in the proper quarters but I think again that you have got to remember that there is not a possible link between every art school and every industry. It is very difficult for big weaving centres like Yorkshire and Lancashire to take a very great interest in the production of textiles in art schools on the South Coast. It may be that some plan will have to be worked out whereby Manchester and Bradford would be very closely linked with the textile trades, Stoke-on-Trent with pottery, Stourbridge with glass, and so on. Each art school should, perhaps, tend to concentrate on one particular industrial production and then be properly linked with that industry.

THE CHAIRMAN: I now wish to propose a very hearty vote of thanks to Mr. Goodale. He stepped into the breach and not only did he read the paper in a most interesting way but he answered the questions, many of them quite difficult ones, admirably. We thank you, Mr. Goodale, very much indeed.

I have been extremely interested in reading this paper and I was very much interested in the importance which Mr. Hunter attaches to touch. I have always felt myself that a person who loves textiles must understand touch. I always look at the way a person picks up a piece of textile goods. Some people handle textiles as though they were pieces of mutton and other people, you can see, immediately understand what they are touching. I attach great importance to that because wear and use and quality are all questions which are extremely important. We in this country have a name for producing quality goods that wear and Mr. Hunter's firm has a reputation for producing beautiful goods as well as goods that give satisfaction for the purpose for which they are produced and that means a very great deal. His firm, the firm of Warners, has also enhanced the reputation of this country for fine, beautiful, quality textiles.

The vote of thanks was carried with acclamation and after a vote of thanks had been accorded the Chairman the meeting then terminated.

OBITUARY

REV. ETHELBERT GOODCHILD.—It is with regret that we have to announce the death on February 22nd of the Reverend Ethelbert Goodchild, M.A., who had been a Fellow of the Society since 1936 and a Member of Council from 1943 to 1946.

Mr. Goodchild had held numerous livings in this country since the time when he was at Gonville and Caius, Cambridge, in 1890, and for a short spell he was Acting Chaplain to the British Embassy at Constantinople. Since 1920 he had been vicar of St. Luke's, Nutford Place, and from the time he was elected a Fellow of the Society in 1936 he used to attend very many of the Society's meetings, being particularly

interested in all matters concerned with Science. He took a lively interest in the Society's affairs, and on several occasions he presided at the Society's meetings. Even during the "blitz" in the recent war he could be relied upon to be among the audience at almost every meeting.

GENERAL NOTES

ARTS AND CRAFTS EXHIBITION.—The twenty-first exhibition of the Arts and Crafts Exhibition Society is on view at the Guildhall Art Gallery until March 20th, and the ideals of this group of distinguished artist-craftsmen, led by Mr. John Farleigh, will not lack the sympathy and appreciation of Fellows of the Royal Society of Arts, which for nearly two centuries has stressed the vital need of creative design and craftsmanship—no less important in mass-manufactured than in hand-made products.

But the fine tradition of the master-craftsman is not a legacy bequeathed only to the skilled designers of successive generations; and Lady Cripps, in her notable speech on the opening day, did well to remind us that "children gain independence and self-confidence in learning to use their hands to create things. When I hear from friends", she went on, "or my own family that their children are learning a handcraft, I know that they are being given a gift and resource for life which will assuage their restless need for rushing about and help to absorb their surplus craving for excitement."

It would indeed be a golden opportunity lost if, during the course of the next week or two, there were not at least as many youthful as experienced visitors to the Guildhall display of fine and applied arts. Young and old alike will certainly not fail to be entranced by the machine-embroidered pictorial designs which (say what the purists please about the peculiar purpose of the medium) are among the most attractive exhibits in the gallery and—particularly when their intention is purely decorative—often achieve a delicate coquetry unexampled in any method of painting. "Moment Musical", with its two charming Victorian figures, by Gladys Burrows, the "Medieval Figures" and "Les Patineurs" by Joyce Badrocke and the lovely "Ballet" by her twin sister Joan (both of whom, Fellows will remember, were recently commended by the judges in the furnishing textile group of the Society's industrial art bursaries competition for 1947) may be mentioned as exquisite examples of machine embroidered decoration, while Hilda Speir's embroidered "Girl with Pekinese" deserves a word of praise for courageously challenging the modern Ecole de Paris in applied design.

Certain crafts, on the other hand, appeal chiefly to a mature taste and experienced eye, and the choice examples of book production contributed by Mr. Arthur Cullen, of the Central School of Arts and Crafts, fall naturally into this category. For his noble pages of "The Pilgrim's Progress" and "Dante's 'Inferno'" he has chosen beautifully appropriate founts, and been singularly fortunate in his collaborators—Mr. John Farleigh and M. Leon Vilaincourt who have designed the wood engravings.

From the textiles, with their lovely repeating patterns, it is difficult to select; but Hilda Breed's block-printed "Music" design on linen, Ronald Grierson's printed rayon "Regency Cameo", Lorna Pillow's "Flower Circle" and "Lemur", and a delightful hand-woven rug by Doris Smith may be singled out as a few examples of highly-skilled craftsmanship.

In the Fine Arts section, the exhibitors generally appear as patient craftsmen rather than inspired artists; that is to say, most of them are more concerned to explore the potentialities of the wood-block and the stone than to communicate an aesthetic emotion. The lithographs (no doubt because lithography is the more spontaneous medium) are, on the whole, more successful than the wood engravings; and Edwin La Dell's delicately coloured lithograph "All Night Café", Russell Reeve's "Family Circle", and Rachel Roberts's sensitive "Mill Pond, Fairford" would certainly hold their own even on the competitive walls of the Academy.

Elsewhere, there are some choice pieces of pottery—notably from Bernard Leach, and Constance Dunn who has employed some exquisite glazes—silver, glass and other products in an assembly of some five hundred exhibits.

N. A. D. WALLIS.

THE IDEAL HOME EXHIBITION.—The Twenty-fifth *Daily Mail* Ideal Home Exhibition opened at Olympia on March 2nd and will continue until the 25th. As usual, it is a huge, popular exhibition covering every side of home life, and it seems that almost everything on display is available for purchase in this country to-day.

The arrangement of the exhibits follows a bazaar-like form in that there is no central or co-ordinating theme; and this makes it difficult to find one's way from section to section. There is a very definite need for many more signposts in this miniature city and for some outstanding landmark in each hall, which would enable one to find one's position from the quite inadequate catalogue plans, quite apart from any question of design. One can wander for hours and get lost in a maze of stalls containing displays of foods, clothing, furniture and every possible household effect. Occasionally in one's wanderings one comes upon a clearing containing a special display such as the weeping ash tree with flower-laden branches, the aquarium, the top of Nelson's Column, and the replica of the Bayeux tapestry.

There is a fine display of modern and prefabricated houses furnished in the latest utility styles, which are simple and charming alongside their expensive non-utility counterparts. Similarly the aluminium house with its prefabricated kitchen and bathroom equipment bears very favourable comparison with the individually assembled pieces in the more classically designed houses.

The pride of the exhibition is, as always, in the gardens with their early daffodils and azaleas amid sloping lawns and running water, and, by a happy arrangement, song from the bird stall just outside the garden entrance completes the charming effect.

Finally, this year the exhibition contains a children's "playland", organised on a lavish scale and a pattern for future exhibitions of this type. An exhibit in its own right, this "playland" is organised with toys and games, puppet show and cinema and is run by a staff of competent nurses and hostesses. The area allocated is even large enough to allow room for children to drive about in miniature pedal cars, and, with traffic lights to control them at crossroads, education in road safety is combined with pleasure.

FLORAL REFLECTIONS ON SWEDEN.—Stockholm, is an old city which, in the last quarter century, has more than doubled its population and its acreage. Its growth has been intelligently controlled. Among its attractions, not the least are the new housing estates, parks and playgrounds which have attracted town planners and architects from this country in ever-increasing numbers since the war. Our professional designers have for some time looked to Sweden for ideas and inspiration. Some of these may be translatable into our own idioms, but what are not so easily imported are the conditions which have made this planning possible. We are, it is true, engaged in a process which might ultimately produce the sort of social democracy which is now typical of the Scandinavian countries. But before achieving this state here there are two lessons we must learn; first, a sense of social or collective responsibility among all sections of the community, and second, that the hardest thing in life is not to get what one wants but to learn to enjoy it. Both these the Swedish citizen appears to understand and practice. This is implicit in the high standard of park design in Sweden, and in the fact that the citizens themselves do both respect and protect the amenities offered and use them to the full. The children's play parks in Stockholm and Malmö are a lesson to our responsible authorities. So are the floral displays in the street corners of Stockholm. Here is something which could be transplanted with profit to our own country. Not that it would be possible, I think, to import Mr. Holger Blom's enchanting "portable parks". The Londoner is too ready to sue the nearest local authority, should he graze his shin on what the magistrate's court would term an "obstruction", to make concrete flower tubs on our city pavements a practical venture. But the use of flower boxes on window sills, the planting of wild flowers in derelict bomb sites, the cleaning up of our tawdry garden squares can be done without the use of controlled

materials. It is in just these simple things that the Swedish people excel. In Stockholm no open space is allowed to become an eyesore. The squares, if paved, are decorated with well planted concrete flower tubs; the seats, which are sited to face the sun and flower borders, are painted, not with "park green", but with primrose, pink and white paint to match the predominant colour scheme of the surrounding borders. It is rare to find a shop or a restaurant without its window boxes or indoor plants. The Norma Restaurants, the Lyons of Sweden, have, as a matter of policy, the most imaginative of plant displays. Climbing plants and flowers have even been placed within the precincts of museums such as the State Historical Museum—one of the best designed in the world. Indeed, the number of flower shops and street flower markets in Stockholm are witness to the tremendous popularity of plants and flowers and the universal interest for window and indoor gardening among the Swedish people.

It was not so long ago, a little over a hundred years, when the British earned European fame as the finest scene makers in history. Our towns, villages and countryside were the envy of European travellers. That genius for creating a humanised landscape is still not dead. Even nearer in time within the memory of many, a fashion for balcony and window gardens, for ferneries and pot plants, swept town and suburb. This fashion is now almost wholly dead. It survives in country cottages and in the boarding house *aspidistra*. The memory, which many must share, of those small towns in northern Sweden with their white painted timber houses, banded by wide horizontal lines of gaily planted flower boxes filled with petunias and blue lobelias, should stimulate us to do the same at home. Timber may be short for window boxes but there are ways of getting over this difficulty. At any rate we have a genius for improvisation. Now is the time to display it.

The London Garden Society.

H. F. CLARK, A.I.L.A.

NOTES ON BOOKS

RECORDING BRITAIN—VOLUMES I AND II. Oxford Press, 1947. £5 5s. set of 4 Vols.

The first two volumes of a set of four, which aim to record the changing face of Britain, have made their appearance, handsomely produced by Geoffrey Cumberlege and sponsored by the Pilgrim Trust. The many illustrations in line (usually enhanced by washes, a number of them in colour) have been admirably annotated by Mr. Arnold Palmer, and record scenes in London and the Home Counties in the first volume, and the disappearing beauties chiefly of the Eastern Counties in the second.

The scheme originated in the autumn of 1939, when the Pilgrim Trust was invited to co-operate in a project of the Ministry of Labour and National Service to commission artists to make water-colour drawings of places and buildings of national interest, particularly those exposed to the danger of destruction by enemy action. A committee was formed consisting of Mr. P. H. Jowett, Sir Kenneth Clark and Mr. Russell Flint, with Mr. Arnold Palmer as Secretary, and nearly a hundred artists were engaged—or offered—to complete a Record which now amounts to some fifteen hundred drawings. These works have frequently been sent on tour under various auspices, and selections of them have been exhibited at the National Gallery, as some of us will recall.

The remarkably high standard of topographical art in this country is revealed in the scores of drawings chosen to illustrate these volumes. W. Fairclough's series of wash-drawings of the noble houses in Petersham and Ham, S. R. Badmin's delicate water-colour of the ancient village of Bow Brickhill near Bletchley, several exquisite studies by Walter Bayes, somewhat akin in feeling to Sickert's pen drawings, and characteristic contributions by John Piper and Stanley Anderson are among the chief joys of the first volume; while the second is distinguished by some notable work from W. P. Robins, Michael Rotherstein and Barbara Jones, who has a lively sketch of merry-go-round figures manufactured in Savage's Yard, King's Lynn.

The third and fourth volumes of this valuable work will be eagerly awaited, and no doubt heavily subscribed for.

N. A. D. WALLIS.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

- MONDAY MARCH 15. Dyers and Colourists, Society of, at the Technical College, **Huddersfield**. 7.30 p.m. Dr. C. S. Whewell. "**Finishing Woollen and Worsted Fabrics.**"
- Electrical Engineers, Institution of, at King's College, **Newcastle-on-Tyne**. 6.15 p.m. J. C. Evans. "**Automatic Regulators and Servo Mechanisms.**"
- TUESDAY MARCH 16. Chadwick Trust, at the Westminster Hospital Medical School, S.W.1. 2.30 p.m. J. R. Nicholls. "**Adulteration of Food and its Detection.**"
- Dyers and Colourists, Society of, at the St. Enoch Hall, **Glasgow**. 7 p.m. Dr. A. J. Turner. "**Unity and Diversity in Textiles with Special Reference to Flax and Man-made Fibres.**"
- Electrical Engineers, Institution of, at the Cavendish Laboratory, **Cambridge**. 8.15 p.m. Professor D. R. Hartree, M.A., Ph.D., F.R.S., "**Electronic Calculating Machines.**"
- Eugenics Society, at the Royal Society, W.1. 5.30 p.m. Dr. W. Mayer Gross. "**Mental Health Survey in a Rural Population.**"
- WEDNESDAY, MARCH 17. Microscopical Society, Royal, at the Hastings Hall, Tavistock Square, W.C.1. 5.30 p.m. (1) Dr. R. J. Ludford. "**Application of the Barnard Ultra-Violet Light Technique for the Study of Living Cells.**" (2) J. Smiles. "**New Development in Visual Light Microscopy.**"
- Regent Advertising Club, at the Royal Society of Arts, W.C.2. 6.30 p.m. John Tarr and Sir Francis Meynell. "**The Use and Misuse of Types.**"
- THURSDAY, MARCH 18. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. A. R. Cooper. "**Load Dispatching and the Reasons for it with Special Reference to the British Grid System.**"
- Road Transport Engineers, Institution of, at the Royal Society of Arts, W.C.2. 6.30 p.m. E. L. Bass. "**Gas Turbines.**"
- Royal Society, W.1. 4.30 p.m. J. D. Griffith Davies. "**John Wilkins and the Royal Society.**"
- FRIDAY, MARCH 19. Atomic Scientists Association, at the Royal Society of Arts, W.C.2. 7 p.m. Dr. E. H. S. Burhop. "**Atomic Energy and Industrial Power.**"
- Electrical Engineers, Institution of, W.C.2. 5.30 p.m. E. W. Cannon and E. Smith. "**The Influence of**

Inverse Time Relay Characteristics on Discriminative Time."

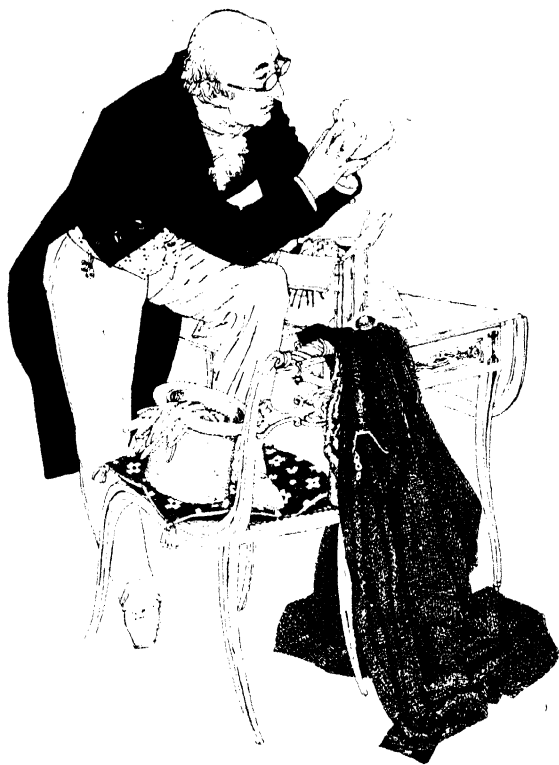
- Sanitary Institute, Royal, at the Town Hall, **Manchester**. 10 a.m. A. Topping. "**Public Health Planning.**"
- SATURDAY, MARCH 20. Chemical Engineers, Institution of, at the College of Technology **Manchester**. 3 p.m. N. T. Gridgeman. "**Value of Statistics to the Chemical Engineer.**"
- SUNDAY, MARCH 21. Kinematograph Society, British, at the G.B. Theatre, Warlour Street, W.1. 11 a.m. A. F. Steel. "**Safety Requirements in the Cinema.**"
- MONDAY, MARCH 22. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. J. W. Leach. "**The Location of Underground Services.**"
- At the Neville Hall, **Newcastle-on-Tyne**. 6.15 p.m. T. W. Ross and R. M. A. Smith. "**Centralized Ripple Control on High-Voltage Networks.**"
- Geographical Society, Royal, S.W.7. 5.30 p.m. Dr. K. M. Strom. "**The Geomorphology of Norway.**"
- TUESDAY, MARCH 23. British Architects, Royal Institute of, W.1. 6 p.m. Dr. T. Bedford. "**Air Hygiene.**"
- Electrical Engineers, Institution of, at the Electricity Department, **Leeds**. 6.30 p.m. J. C. Evans. "**Automatic Regulators and Servo Mechanisms.**"
- Hull Chemical and Engineering Society, at the Church Institute, **Hull**. 7.30 p.m. H. D. MacMurray. "**Some Aspects of Modern Drying Practice.**"
- Textile Institute, at the Royal Society of Arts, W.C.2. 6.30 p.m. F. C. Harwood. "**The History, Art and Science of Laundering.**"
- WEDNESDAY, MARCH 24. Anglo-Iraqi Society, at the Royal Society of Arts, W.C.2. 4 p.m. J. D. Atkinson. "**Some Problems of Irrigation in Iraq.**"
- Dyers and Colourists, Society of, at the Victoria Station Hotel, **Nottingham**. 7 p.m. G. H. Lister. "**The Absorption of Acid and Chrome Dyes by Wool.**"
- Electrical Engineers, Institution of, at the College of Technology, **Manchester**. 7.30 p.m. P. Dunsheath. "**Electricity and Everyman.**"
- Microscopical Society, Royal, Tavistock Square, W.C.1. 6 p.m. H. L. Shipp. "**The Microscopy of Food.**"
- THURSDAY, MARCH 25. Metals Institute of, at the James Watt Memorial Institute, **Birmingham**. 6.30 p.m. L. F. Denaro. "**The Metallurgy of Alloy Steel Welding.**"
- Sound Recording Association, British, at 3 Abbey Road, N.W.8. 7.15 p.m. W. S. Barrell. "**High Quality Disc Recording.**"



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William Hyde Wollaston

To the scientist of today, a laboratory without platinum apparatus would be unthinkable. Yet for a hundred years after its discovery this valuable metal remained unused because it could not be worked. It was an English doctor, William Hyde Wollaston, who discovered that spongy platinum becomes

malleable when strongly compressed. By using this process he was able to manufacture platinum apparatus, and was the first to do so on a commercial scale. One of a family of fourteen, Wollaston was born in 1766. He read medicine at the University of Cambridge and practised for a time, but retired from the profession in 1800 to devote his energies to chemical research.

As well as developing his method of working platinum commercially, he did a great deal of purely academic research and discovered two new metals. The first was called palladium and the second rhodium because of the rose pink colour of many of its compounds. He also investigated the production of electricity by chemical means, and carried out many experiments in optics. Among his inventions was that of the cryophorus—an instrument for showing how the temperature of water falls as it evaporates. Wollaston had unusually keen vision and steady hands, being able to write on glass with a diamond in a script so small that normal people could only read the characters through a microscope. He enjoyed a considerable reputation among his contemporaries for the accuracy of his work and his resourcefulness as a practical scientist. He died in 1828. Every piece of platinum apparatus in the laboratories of the world is a monument to the work of this British scientist.



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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4765

FRIDAY, MARCH 26th, 1948

Vol. xcvi

MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:

THURSDAY, APRIL 1ST, at 2.30 p.m. (*India, Pakistan and Burma Section*).—“THE BURMESE VIEWPOINT”, by the Rev. G. Appleton, M.B.E. M.A., Major General Sir Hubert E. Rance, G.C.M.G., G.B.E., C.B., late Governor of Burma, will preside. (Joint meeting with the East India Association).

WEDNESDAY, APRIL 7TH, at 2.30 p.m.—Craftmanship.—(vi) “CODES OF WORK IN GLASS HISTORY”, by W. A. Thorpe, Colonel C. E. B. Mackintosh, D.S.O., late Director of the Science Museum, will preside. (The lecture will be illustrated by lantern slides).

MEETING OF COUNCIL

A meeting of Council was held on Monday, March 8th, 1948. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Professor E. N. da C. Andrade; Mr. F. H. Andrews; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Edward Crowe; Sir Thomas Dunlop; Dr. R. W. Holland; Sir Henry McMahon; Mr. F. A. Mercer; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. William Will and Mr. J. G. Wilson; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Anderson, Alexander John, Wrabness, Essex.
Andrew, James George, Bramley, Surrey.
Annis, Leslie George, M.Sc., Wisbech, Cambs.
Atkins, Arthur Allen, M.B.E., M.A., Old Coulsdon, Surrey.
Barkham, Ronald Hugh Morris, B.Sc., Grantham, Lincs.
Barrett, Hugh Gilchrist, Hundon, Suffolk.
Beecroft, Walter Gordon, Leigh-on-Sea, Essex.
Bonham, Leonard Charles, London.
Brandon, John Gordon, Kogarah, Australia.
Brisbane, Hugh Lancelot, Peppermint Grove, Australia.
Brown, J. Harry, Barrow-in-Furness, Lancs.
Chambers, George, London.
Cherry, Stanley Edward, Bedford.
Clark, Colin Reginald, Lincoln.
Cole, Frederick Walter, London.
Coles, Cyril Lorrain, B.A., LL.B., Transvaal, South Africa.
Cope-Christie, James Alfred, O.B.E., F.R.I.B.A., Salisbury, S. Rhodesia.
Copland, Miss Margaret M., B.Sc., Wrexham, N. Wales.
Cowin, Douglass Maurice, B.Arch., A.R.I.B.A., Johannesburg, S. Africa.
Drache, Victor, M.D., F.R.C.S., Vancouver, Canada.
Fry, Henry Kenneth, D.S.O., B.Sc., M.D., Crafers, South Australia.
Hipkins, Geoffrey John, B.Sc., London.
Hughes, George Henry Augustus, London.

Hughes, George Kenneth, London.
 Kalianpur, Prabhakar, New Delhi, India.
 Lankshear, Harold James Wallington, London.
 McCormick, Charles Perry, Baltimore, U.S.A.
 Marriott, Robert Henry, D.Sc., Betchworth, Surrey.
 Nathan, The Right Hon. Lord, P.C., T.D., D.L., J.P., London.
 Pigott, Reginald John, Oxford.
 Pittar, Edward George Felix, Parkstone, Dorset.
 Pryor, John James, M.Sc., Yeovil, Somerset.
 Ross-Mansell, John, B.Sc., Edgware, Middlesex.
 Sadler, Arthur, London.
 Saxon, James, Coleshill, Warwicks.
 Stamp, Albert Horace, B.A., Llandudno, Carmarthen.
 Stevenson, Victor Thomas George, East Cowes, Isle of Wight.
 Thornton, Russel William, C.M.G., C.B.E., Cape Province, South Africa.
 Tin, U Than, Rangoon, Burma.
 Trigg, Ronald Edmund, Llanmartin, Mon.
 Vanstone, Lionel Frederick, L.R.I.B.A., Plymouth, Devon.
 Whiddington, Professor Richard, C.B.E., M.A., D.Sc., F.R.S., Leeds.
 White, Carl, Wembley, Middlesex.
 Willis, Henry, London.
 Yerbury, Francis Rowland, Hon. A.R.I.B.A., Flackwell Heath, Bucks.

Further consideration was given to the award of the Albert Medal for 1948.

It was reported that 26,057 entries had been received for the Society's Spring Examinations.

It was agreed to support the East India Association in making representations to H.M. Government regarding the future of the India Office building and its important contents.

A quantity of formal and financial business was also transacted.

INDUSTRIAL ART BURSARIES BOARD

The Council, at their meeting on 8th March, decided to adopt a new constitution for the Industrial Art Bursaries Board which, originally set up in 1937, had become somewhat unrepresentative and out-of-date.

The new Board will consist of

Members of Council of the Society

Mr. F. H. Andrews, O.B.E.; Sir Edward Crowe, K.C.M.G.; Sir Atul Chatterjee, G.C.I.E., K.C.S.I.; Mr. T. C. Dugdale, R.A., R.P.; Mr. E. W. Goodale, C.B.E., M.C.; Sir Harry Lindsay, K.C.I.E., C.B.E.; Sir Henry McMahon, G.C.M.G., G.C.V.O., K.C.I.E., C.S.I.; Mr. J. A. Milne, C.B.E.; Mr. E. Munro Runtz, F.R.I.C.S.; and Mr. William Will, C.B.E.

One representative each from

The Faculty of Royal Designers for Industry; The Council of Industrial Design; The Ministry of Education; The Federation of British Industries; The Royal Institute of British Architects; The Design and Industries Association; and The Society of Industrial Artists.

One representative from each industry participating in the competition.

The Council also, with very deep regret, accepted the resignation of the

Chairman of the Board, Mr. Oswald P. Milne, F.R.I.B.A. Mr. Milne had been an active member of the Board since it was first set up, and Chairman since 1942. He had a great deal to do with the original shaping of the scheme for the competition, which owed much of its success to his energy and enthusiasm. Mr. E. W. Goodale, C.B.E., M.C., has been appointed Chairman of the Board in his place.

THOMAS GRAY MEMORIAL TRUST COMMITTEE

The Council, at their meeting on 8th March, decided with great regret to accept the resignation, due to reasons of health, of Captain A. H. Ryley, C.B.E. from his Vice-Presidency of the Society and from the Chairmanship of the Thomas Gray Memorial Trust Committee. Captain Ryley has given very valuable service to the Society during his Chairmanship of this Committee, to which position he was appointed in the Winter of 1939. He was an Elder Brother of Trinity House. His position on the Council and as Chairman of the Thomas Gray Memorial Trust Committee will be taken by Captain L. G. Garbett, C.B.E., R.N.(ret.), who was until recently Director of the Naval Meteorological Service. Captain Garbett is a Younger Brother of Trinity House and was awarded the U.S.A. Legion of Merit in 1946.

THE ALBERT MEDAL

The Council will shortly proceed to consider the award of the Albert Medal of the Royal Society of Arts for 1948. They, therefore, invite Fellows of the Society to forward to the Secretary the names of such men of high distinction as they think worthy of this honour. The medal was struck to reward "distinguished merit in promoting the Arts, Manufactures and Commerce", and has been awarded as follows in previous years:

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| 1864. Sir Rowland Hill. | 1883. Sir Joseph Dalton Hooker. |
| 1865. His Imperial Majesty
Napoleon III. | 1884. Captain James Buchanan Eads. |
| 1866. Michael Faraday. | 1885. Sir Henry Doulton. |
| 1867. Sir W. Fothergill Cooke and Sir
Charles Wheatstone. | 1886. Samuel Cunliffe Lister (afterwards
Lord Masham). |
| 1868. Sir Joseph Whitworth. | 1887. HER MAJESTY QUEEN VICTORIA. |
| 1869. Baron Justus von Liebig. | 1888. Professor Hermann Louis Helm-
holtz. |
| 1870. Vicomte Ferdinand de Lesseps. | 1889. John Percy. |
| 1871. Sir Henry Cole. | 1890. Sir William Henry Perkin. |
| 1872. Sir Henry Bessemer. | 1891. Sir Frederick Abel, BT. |
| 1873. Michel Eugene Chevreul. | 1892. Thomas Alva Edison. |
| 1874. Sir C. W. Siemens. | 1893. Sir John Bennet Lawes, BT. and
Sir Henry Gilbert. |
| 1875. Michael Chevalier. | 1894. Sir Joseph (afterwards Lord) Lister. |
| 1876. Sir George B. Airy. | 1895. Sir Isaac Lowthian Bell, BT. |
| 1877. Jean Baptiste Dumas. | 1896. Professor David Edward Hughes. |
| 1878. Sir Wm. G. Armstrong (afterwards
Lord Armstrong). | 1897. George James Symons. |
| 1879. Sir William Thomson (afterwards
Lord Kelvin). | 1898. Professor Robert Wilhelm Bunsen. |
| 1880. James Prescott Joule. | 1899. Sir William Crookes. |
| 1881. Professor August Wilhelm
Hofmann. | 1900. Henry Wilde. |
| 1882. Louis Pasteur. | 1901. HIS MAJESTY KING EDWARD VII. |
| | 1902. Professor Alexander Graham Bell. |
| | 1903. Sir Charles Augustus Hartley. |

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| 1904. Walter Crane. | 1925. Lieut.-Colonel Sir David Prain. |
| 1905. Lord Rayleigh. | 1926. Professor Paul Sabatier. |
| 1906. Sir Joseph Wilson Swan. | 1927. Sir Aston Webb. |
| 1907. The Earl of Cromer. | 1928. Sir Ernest Rutherford (afterwards Lord Rutherford). |
| 1908. Sir James Dewar. | 1929. Sir J. Alfred Ewing. |
| 1909. Sir Andrew Noble. | 1930. Professor Henry E. Armstrong. |
| 1910. Madame Curie. | 1931. H.R.H. THE DUKE OF CONNAUGHT AND STRATHEARN. |
| 1911. The Hon. Sir Charles Algernon Parsons. | 1932. Frank (now Sir Frank) Brangwyn. |
| 1912. The Right Hon. Lord Strathcona and Mount Royal. | 1933. Sir William Llewellyn. |
| 1913. HIS MAJESTY KING GEORGE V. | 1934. Sir Frederick Gowland Hopkins. |
| 1914. Chevalier (afterwards Marchese) Guglielmo Marconi. | 1935. Sir Robert A. Hadfield, BT. |
| 1915. Sir Joseph John Thomson. | 1936. The Earl of Derby. |
| 1916. Professor Elias Metchnikoff. | 1937. Lord (now Viscount) Nuffield. |
| 1917. Orville Wright. | 1938. HER MAJESTY QUEEN MARY. |
| 1918. Sir Richard Tetley Glazebrook. | 1939. Sir Thomas H. Holland. |
| 1919. Sir Oliver Joseph Lodge. | 1940. John A. Milne. |
| 1920. Professor Albert Abraham Michelson. | 1941. President Franklin D. Roosevelt. |
| 1921. Sir J. Ambrose Fleming. | 1942. Field-Marshal J. C. Smuts. |
| 1922. Sir Dugald Clerk. | 1943. Sir John Russell. |
| 1923. Major-General Sir David Bruce, and Colonel Sir Ronald Ross. | 1944. Sir Henry Tizard. |
| 1924. H.R.H. THE PRINCE OF WALES. | 1945. Winston Spencer Churchill. |
| | 1946. Sir Alexander Fleming and Sir Howard Florey. |
| | 1947. Sir Robert Robinson. |

THE SWINEY PRIZE FOR A WORK ON JURISPRUDENCE

The Council give notice that the next award of the Swiney Prize will be made in January, 1949, the hundred and fifth anniversary of the testator's death. The Prize is a cup, of a value of £100*, and £100 in cash.

The award is made by a joint committee of the Royal Society of Arts and the Royal College of Physicians, which appoints special adjudicators.

The Prize is offered alternately for Medical and General Jurisprudence, but if at any time the committee is unable to find a work of sufficient merit in the class whose turn it is to receive the award, it is at liberty to recommend a book belonging to the other class. On the last occasion of the award (1944) the Prize was awarded for General Jurisprudence. It will, therefore, be offered on the present occasion for Medical Jurisprudence.

Any person desiring to submit a work in competition, or to recommend any work for the consideration of the Judges, should do so by letter, addressed to the Secretary of the Society, not later than November 30th, 1948.

The following is the list of former recipients:

- 1849.—J. A. PARIS, M.D. and J. FONBLANQUE, for their work, "Medical Jurisprudence".
- 1854.—LEONE LEVI, for his work, "The Commercial Law of the World".
- 1859.—Dr. ALFRED SWAYNE TAYLOR, F.R.S., for his work, "Medical Jurisprudence."

* The Council of the Society have agreed in the present circumstances that the value of the cup awarded should be increased to £150.

- 1864.—HENRY SUMNER MAINE (afterwards K.C.B.), D.C.L., for his work, "Ancient Law".
- 1869.—WILLIAM AUGUSTUS GUY, M.D., for his "Principles of Forensic Medicine".
- 1874.—THE RIGHT HON. SIR ROBERT JOSEPH PHILLIMORE (afterwards Lord Phillimore), D.C.L., for his "Commentaries on International Law".
- 1879.—DR. NORMAN CHEVERS, for his "Manual of Medical Jurisprudence of India".
- 1884.—SHELDON AMOS, M.A., for his work, "A Systematic View of the Science of Jurisprudence".
- 1889.—DR. CHARLES MEYMOTT TIDY, F.C.S., for his work, "Legal Medicine".
- 1894.—THOMAS ERSKINE HOLLAND (afterwards Kt. Bachelor), K.C., D.C.L., for his work, "The Elements of Jurisprudence".
- 1899.—DR. J. DISON MANN, F.R.C.P., for his work, "Forensic Medicine and Toxicology".
- 1904.—SIR FREDERICK POLLOCK, Bt. and PROFESSOR F. W. MAITLAND, for their work, "The History of English Law before Edward I".
- 1909.—DR. CHARLES MERCIER, F.R.C.P., F.R.C.S., for his work, "Criminal Responsibility."
- 1914.—JOHN W. SALMOND, K.C., for his work, "Jurisprudence".
- 1919.—DR. CHARLES MERCIER, F.R.C.P., F.R.C.S., for his work, "Crime and Criminals".
- 1924.—PROFESSOR SIR PAUL VINOGRADOFF, F.B.A., for his work, "Outlines of Historical Jurisprudence".
- 1929.—PROFESSOR SYDNEY SMITH, M.D., for his work, "Forensic Medicine".
- 1934.—PROFESSOR SIR WILLIAM S. HOLDSWORTH, K.C. (afterwards O.M.), for his work, "A History of English Law".
- 1939.—PROFESSOR JOHN GLAISTER, M.D., D.Sc., F.R.S.E. and PROFESSOR J. C. BRASH, M.C., M.A., M.D., F.R.S.E., F.R.C.S.(ED.), for their work, "Medico-Legal Aspects of the Ruxton Case".
- 1944.—CARLETON KEMP ALLEN, M.C., M.A., D.C.L., for his work, "Law in the Making".

CRAFTSMANSHIP

(IV) CRAFTSMANSHIP AND LEATHER

By JOHN W. WATERER, N.R.D., F.S.I.A.

Eleventh Ordinary Meeting, Wednesday, February 11th, 1948

Mr. J. A. MILNE, C.B.E., J.P., a *Vice-President of the Society, in the Chair*

THE CHAIRMAN: Craftsmanship: the old inherited pride in the work of a man's hands. That is a description which I came across recently and which struck me as being very happily expressed. In this country we have always excelled in craftsmanship. It has been, in many ways, the backbone of our prosperity and success. Although the machine has of necessity displaced the days when the craftsman held his own it is still dependent on him for the beauty and quality which is, or should be, inherent in most things in our daily lives. Far from the craftsman, and particularly the artist craftsman, being a thing

of the past he is more necessary than ever to-day unless culture is to go—which Heaven forbid—for without it no nation can ever be truly great. It was for those reasons that the Royal Society of Arts, which has always been foremost in promoting arts and commerce, decided to arrange a series of lectures on this all-important subject, of which this one forms part.

No material holds a higher place or has a longer history in the crafts than leather. The name is synonymous with quality. There is nothing like leather! Every school-boy knows that, although to him it often has a deeper meaning! Then there is the famous couplet of Alexander Pope's:

"Worth makes the man, the want of it the fellow;

The rest is nought but leather and prunella".

That illustrates the difference between the fine and enduring, and the commonplace and ephemeral. There is no one more competent to discourse on this fascinating subject than Mr. Waterer whose knowledge of it is profound and whose recently published book is likely to become a classic. I will therefore, without more ado, call upon Mr. Waterer to address you.

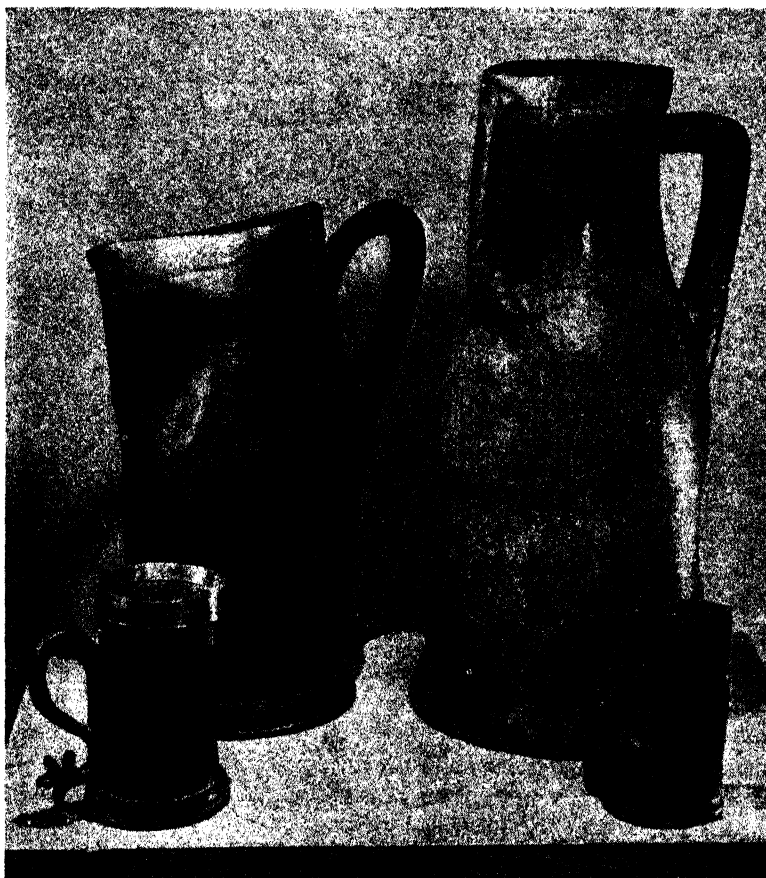
The following paper was then read:

The story that lies behind the many leather articles which we still regard as prime necessities of life is so immeasurable that I can only touch on certain phases of it. It would probably be true to say that no other fundamental material has, through the ages, been put to such a variety of common uses as leather. Some of these have passed out of currency, others remain, as important to-day as they ever were. I have chosen, therefore, to deal, in the main, with some of the principal uses or characteristic methods of preparation and fabrication which have any bearing on the present and the future, with a glance backward at the general history for the sake of focus.

I can only refer in passing to the enormous variety of different kinds of leather now at the disposal of the user, varieties which depend firstly upon the character of the particular hides or skins of beasts, birds or fish; secondly upon the methods (broadly known as "tanning") by which they are transformed into leather; and thirdly by the great diversity of methods of dressing and finishing. The twilight of extreme antiquity effectually obscures the origins of man's discovery of how to transmute the intractable and putrescible coverings of living creatures into a permanent, durable and extremely serviceable substance, but we know, with reasonable certainty, that leather of a kind was already in use in Britain in neolithic times and probably long before. Concrete evidence is very slight and what we know of these early days depends more upon deduction than upon ascertained fact.

The early history of leathercraft is veiled in obscurity. We know that during the neolithic period there were primitive flint scrapers which were probably used for scraping flesh from pelts after some elementary preparation, such as softening and preserving to some extent with fat and brains. Then about 10,000 B.C. there were probably leather cups or bowls. In such containers as these water was heated with stones from a fire, and therefore a certain degree of skill must have been involved in the making of vessels capable of this. From Saxon times we have recovered silver bowl rims which had fragments of leather still adhering to them, and in many early medieval records we can find references to water-bougets or budgets, used for carrying supplies, but no examples of these are known to exist, although we have a few early sculptural representations.

The extraordinary manner, in which leather of suitable type can be moulded when softened by water into almost incredible forms that can be permanently set by the application of heat, thus appears to have been a very early discovery and its most logical development almost certainly occurred in this country. This capacity arises from the fibrous character of leather which has no exact equivalent in any other material. The earliest examples existing of this use are for protective armour. Other military uses of *cuir bouilli* included shields, sword and dagger sheaths, powder



Courtesy of Worshipful Company of Leathersellers, the Museum Fund of the National Leather Goods and Saddlery Manufacturers' Association, and the Author.

FIG. 1.—The bombards and black-jacks of the Middle Ages

and shot flasks, and helmets; and Froissart even mentions the use by Edward III in the French wars of small boats of leather.

Right through the Middle Ages and beyond, all kinds of containers for all sorts of purposes were made by this process, many of them beautifully decorated by moulding from back or punching and incising, and there were also many stereotyped carelessly-ornamented things of everyday use which were obviously made in large quantities.

Perhaps the most spectacular use of *cuir bouilli* was for water bottles, black-jacks and bombards or jugs, whose regular use can be traced from the twelfth to the nineteenth century and of which substantial numbers still exist. Workmen of these times had very little choice either of material or method—traditions both of form and decoration endured for long periods, for example, the *fleur-de-lys* which persisted conspicuously for five centuries as a decorative motif. All these articles were made from oak-bark tanned cattle hide and were lined with pitch, resin, or in higher grade black-jacks, with pewter or silver.

Cuir bouilli in panel form was used for box coverings, and, although I have never

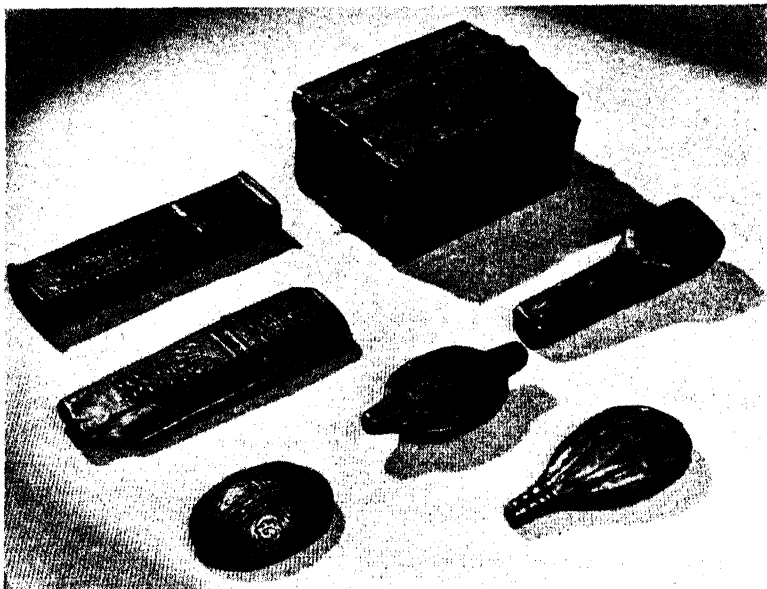


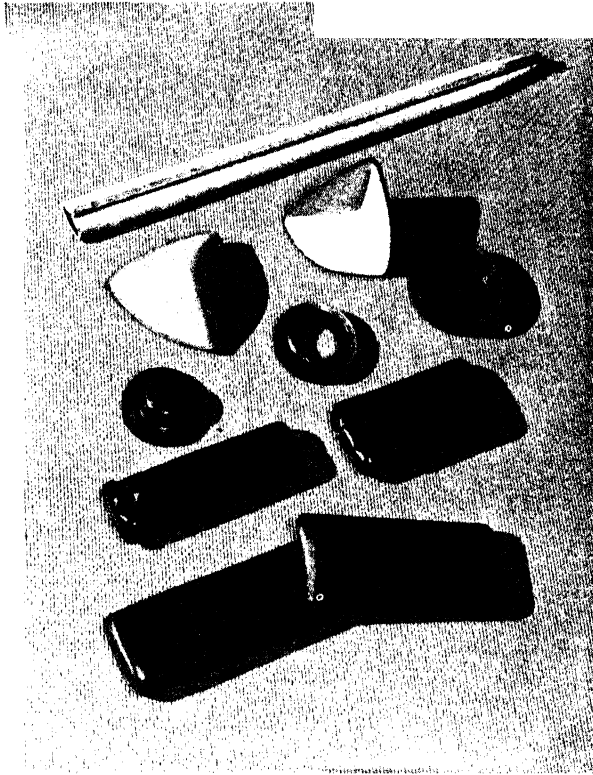
FIG. 2.—Medieval "personal" leather goods showing wood covered with leather decorated with three processes; punching and incising, cuir, bouilli, and on the knife sheath to the left building-up in layers

come across an example, for book bindings. Except for these, all examples of this type of work met the everyday needs of the times. They were practical, light in weight, pleasing to look upon and extremely durable. Present-day examples of this type of work include bayonet scabbards, pump cups and washers, cycle saddles, surveyors' tape cases and some kinds of cigar cases.

One of the most important uses for leather throughout the ages has been for the traveller. It is easy to picture early man packing his few precious possessions into a small bag or a larger bale made of rudely-preserved animal skins. Sculptures and pictures through the Middle Ages show many examples of cases and beautifully moulded flasks. When royalty and the nobility travelled they carried with them an astonishing collection of household goods, and we even have *cuir bouilli* cases for ewer and bason.

Horse accoutrements of leather are mentioned in the eleventh century Colloquy of Aelfric and remained of vital importance until recently. The medieval saddle

was a very different article from the modern type. Early manuscripts show it as a kind of seat with which travellers often used leather cushions. The modern hunting saddle is of a type which dates roughly from the seventeenth century and is one of the most perfect things our industry can now show. Litters and early coaches were made of light wooden frameworks covered with leather, and similarly eighteenth century sedan chairs. Very large quantities of leather with a durable spongeable finish are used to-day in the motor-car industry.



*From Leather: in Life, Art and Industry,
by J. W. Waterer. (Faber & Faber, 1946)*

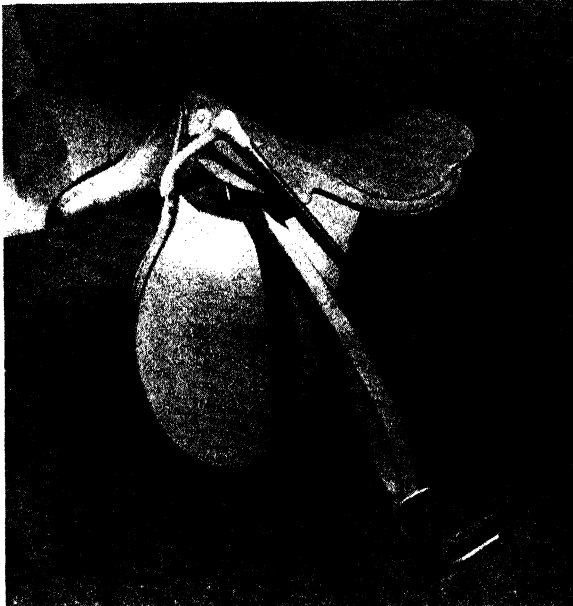
FIG. 3.—*Modern examples of the use of the moulding process known, in medieval times, as cuir bouilli: bayonet sheath, trunk corners, pump-cups and cigar cases*

Unfortunately the only records of early medieval luggage we have are the containers met with in inventories and other documents—quaint names such as gardeviaunce, clothe-sacke, budget and male. All these were most probably limp leather containers of a type convenient to carry on horseback. There were also large (up to 7 feet) trunks and similar coffers, the nailing of which besides being decorative helped to attach the leather to the wooden shell.

Solid leather portmanteaux and companion smaller cases appeared towards the end of the eighteenth century and were made by a saddler. They provided the measure of resilience which we now recognise to be essential in luggage. They were

made of full substance cattle-hide without foundation and were very heavy but practically everlasting. After these heavy types we begin to get light-weight leather luggage made of split-hide and with very little stiffening. They seem to have been developed here by a group of German refugees from the Prussian revolution of 1848 and their ancestor was, I believe, the metal-framed carpet bag said to have been invented in Paris about 1823.

The modern introduction of the slide fastener has resulted in much improvement, making it possible to discard metal frames, locks and, sometimes, most of the rigid



Courtesy of Leather, Footwear and Allied Industries Export Corporation.

FIG. 4.—*The English hunting-saddle with pigskin seat and grained hide flaps*

stiffening material. From this period the pace accelerated to a race with alternative materials, and the influence of the "missing technician"—the designer for industry—begins to be detected, until now you have the light zip bag made with split cattle-hide with fast colour, spongeable finish, and which, in due course, will be mould- and rot-proof.

There have also been concurrent changes in the rigid forms of hand-luggage. An important innovation was the use of thin but strong plywood in combination with rawhide or suitably dressed split-hide, and there have also been adaptations to incorporate the wardrobe principle. Most of these articles require a high proportion of hand work but machinery now successfully performs such operations as the cutting of linings and small parts, the spreading of adhesives, skiving, stitching, riveting, edge-finishing and polishing.

I have only time to mention briefly the use of leather as clothing—many references are found in early ordinances to the use of leather for clothing and footwear for

the common man—"whose chief wearing leather is". In the fifteenth century he wore a buff tunic, oil-dressed and made originally from European buffalo pelt. From Norman times until the fifteenth century fashionable footwear seems to have been made of cordwain leather. These were quite unsuitable and it is easy to comprehend why in 1350 a pair of shoes cost 6*d.* and could be made while the customer waited. The more substantial type really developed as a result of the seventeenth century military campaigns and the real artists of the footwear trade were the "long-boot men" who throughout the nineteenth century supplied the wealthy. Nowadays, although some people still have their footwear made by hand to their own last—and no one who has not done so can appreciate what such a pair of shoes can be—the majority of shoes are made by machine. Quality is maintained by the



Photograph by Council of Industrial Design.

FIG. 5.—*A contemporary light-weight (5½ lbs.) leather travelling bag. The only metal used is in the teeth of the slide-fastener and the handle fittings. Jacquard rayon lining designed by Enid Marx, R.D.I.*

cut, the design and the workmanship, but naturally suffers if the material is of poor quality.

The history of gloves is obscure but a picture in the Tickhill Psalter (c. 1310) shows what are probably leather gloves. As in most other branches of leathercraft, the highest standard of workmanship and the greatest degree of refinement in glove-making has been reached during the past 150 years and still persists. We have, however, neither the materials nor the traditions of other countries in respect of fashion gloves, but we are making great progress. An important development in this trade of recent years has been the growing use of protective gloves in industry. Specially dressed leathers and carefully devised methods of making provide protection against hot liquids, acids, abrasive processes, welding, and so on.

Lastly there are women's handbags, bookbinding and several other examples of the use of leather which I have no space to discuss.

I hope this brief survey will serve to show the unique part that the leather crafts have played, from time immemorial, in this country, and to point the way to

an equally distinguished future. I have used the word "unique" and I believe it to be strictly accurate. There are many proofs that leather craftsmanship has contributed conspicuously to the progress of man, and that it has been, for countless ages, and still is, a vital constituent of the warp and weft of British life. Lest you consider this an exaggerated claim, may I invite your consideration of the numerous references in our literature, which deal with leather in a familiar and often jocular

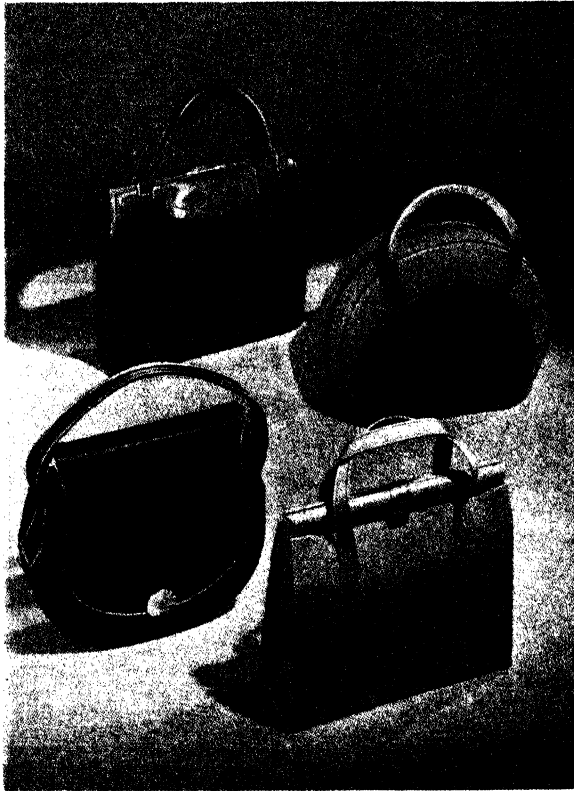


FIG. 6.—*A few of the many widely-differing types of handbags and shopping-bags in which design is largely dependent upon expert knowledge of the characteristics of the leather employed*

manner: of the delight of our forefathers in their bottles, bombards and black-jacks, expressed liberally in song and rhyme; of the carelessness with which we use, every day of our lives, some indispensable leather objects without which life would be very different—objects whose unconsidered perfection results from the accumulated skill of thousands of years. May we now, for a short time, consider some of the wider implications of this notable record and try to determine its significance for the future in an age when the lament is so often heard that craftsmanship is dead?

An increasing number of thinkers during the past two decades have doubted whether the pursuit of human happiness is as closely bound up with "progress" as specialists would have us believe. This doubt has become more widespread

(or at least, more articulate), since the advent of atomic fission. I am not, at this point, referring to the invention and use of the atom bomb only, I refer to what many consider a microcosm of the world's state, perhaps half a century ahead, presented to us by the vast and mounting industrial production of the U.S.A. When, as now seems inevitable to many, the whole world has become industrialised; when every nation has equipped itself with machinery capable of producing far more than it can consume; when America's problem of distribution has become universal—how much nearer will mankind be to the *ultima Thule*, the realm of the four freedoms, of happiness and contentment?

Perhaps, however, this auto-suffocation of the industrial machine will never come about. One of the troubles with machine-production is that it encourages the making, on a vast scale, of ephemeral and worthless rubbish on which a gullible public is persuaded, by blatant advertising, to waste its substance. Sometimes we are presented with synthetic materials—such as “plastic leather”—which appear to have no economic justification at all. Thus are dissipated not only man-power but materials which could have served better purposes. Already it is beginning to be realised that in some cases the drain on “natural resources” by the voracious machine-production of our age is outstripping supply.

The economist's antidote against over-production is a progressive reduction in hours of work. But is this a really adequate solution of either the human or economic aspects of the problem? If a halt could be called to technical development it might be a partial one. But at present we are calling for an ever-increasing tempo, more “progress”, bigger and better machines, more specialists. “Progress” is the product of specialisation. Specialisation usually spells monotony and narrow-mindedness and all that they engender. The specialist is often more concerned with the means than the end. The implications of a certain course of development are rarely, if ever, fully thought out in advance by responsible persons. Quality—even such quality as the machine under efficient control can provide—is sacrificed to quantity. Many sins are committed in endeavours to keep expensive plant “economically” employed, to meet the competition of more “advanced” countries or merely in the sacred name of “progress”. In certain limited fields—notably those which reduce drudgery—technical advances have, of course, contributed to human happiness. Contrast the power-saw with the saw-pit, or the suction-cleaner with the brush-and-pan. But labour-saving devices and machinery are easily overdone and thus merely result in senseless competition with no real benefit to the consumer. But, on the whole, contemporary man knows not how to employ what leisure he already has! Does it profit him individually or collectively to spend more time watching professional sport (what a contradiction in terms!), tipling at bottle-parties, gambling at “the dogs” or at cards, enriching pool-promoters, wallowing in fatuous films or holiday-making in regimented camps? Is man less likely to fritter away his leisure as he becomes more and more robotised, more and more state-directed, more and more a mass-minded constituent with no will or ambition of his own?

The relationship between “work” and “leisure” has attracted some attention of late and the consequent discussions have, unfortunately, tended to widen the artificial gulf between the two. Little thought, however, seems to have been given to the place of craftsmanship in the scheme of things. This is probably due to the

false impression, which has grown up in recent times, of what craftsmanship really signified in the days before the introduction of power-driven machinery. It is necessary to differentiate between art (which is creative genius) and craft (which is skilled use of hand and eye). In too many spheres the artist-craftsman has gradually become a glamorised almost super-human being, immured in an "ivory tower", dependent, in this insecure age, for sustenance on uncertain patronage and for reputation on the caprices of the professional critic.

It is important for our purpose to acquire a clear understanding of the part that craftsmanship has played in the development of the human race. "In the sweat of thy face shalt thou eat bread": the biblical words are still true but their significance is often obscured by the complexities of contemporary civilisation. A study of the history of the misteries (or trade-gilds as they are sometimes rather incorrectly called) would reveal as a complete chimera the popular conception of the "great days" of craftsmanship (which usually means prior to the Renaissance) as a golden age when every man was a creative artist, every worker industrious, happy, contented and adequately rewarded. Such a conception is, I believe, not only against all probability but also against all historical fact. For one thing it assumes a fundamental change in human character within so small a fraction of time as a thousand years, which I believe to be impossible: secondly, it ignores the inexorable pressure of economic conditions. The story is rather one of suppression, harsh treatment, crude justice, of exaltation of the clever and cunning over the humble and meek, of constant strife and rebellion against injustice and oppression: all these coupled with intolerable living conditions, destructive conflagrations and dreadful epidemics without parallel in any civilised community to-day. The medieval misteries, which wielded autocratic power over the workmen, were first and foremost monopolies, their operations primarily directed towards the establishment and maintenance of privilege in the hands of the few possessed of organising ability and control of the means of production. Apprentices and journeymen were first a source of cheap labour and only secondly of recruitment to the higher ranks, entry to which was made as difficult as possible. Even the constant struggle to maintain quality of workmanship and material was part of the system for it was realised that maintenance of monopoly was dependent upon the satisfaction of patrons. These are not the conditions in which to find the Utopia of which Sir Thomas More could only dream.

The artist-craftsman existed in every trade but he was as rare then as now. It was not he who provided with his own hands the bulk of manufactured goods that served the needs of his time. Even in quite early days there was division and sub-division of labour, resulting in specialised repetition work to an extent not generally realised. But to admit the superiority and leadership of the rare creative master-craftsman is not to deny a degree of craftsman's skill in the humbler workman who was condemned by either lack of ambition or deliberate suppression to a lowlier status. Despite the conditions, despite much hum-drum repetition and drudgery, it is reasonable to suppose that on the whole the average man derived more enjoyment from his work than he commonly does to-day, because he worked in materials possessing real character, over whose vagaries he was obliged to establish intelligent control. Also the constant insistence on quality, even if it was not

altruistic in conception or more than partially effective, undoubtedly laid the foundation of that reputation for sound, if unadventurous workmanship which is such a valuable heritage. Maybe in some spheres the workman was a freer agent, but, in general, we have allowed, wholly unjustifiably, a haze of Morris-tinted romanticism to warp our conception of craftsmanship; have permitted ourselves to believe that every workman was a fully responsible, satisfied and richly-creative being. I believe, too, that we tend to judge the past by surviving examples of ancient workmanship which, in the case of museums, are often carefully selected and, generally speaking, not truly representative. There is a more or less general belief that in medieval times every object, even in the humble cottage, was well-designed and well-made by workers who for some unexplained reason were able to devote unlimited time to their manufacture, although how this lavish use of time was paid for, except by the wealthy, is not explained. Such a procedure would have been as uneconomical then as it would be to-day. Unfortunately, too, for the theory of universal integrity plenty of examples do exist of perfunctory, and downright bad work and stereotyped decoration lavishly, but often carelessly used over long periods, even from periods generally credited with high standards: but such things are not usually found in museums. Also we cannot overlook the implications of the constant struggles of the organised misteries to prevent bad workmanship: these are heavily documented in the extant records. Had all, or even the majority of workmen been conscientious, painstaking craftsman there would have been no need for the system of punitive operations of the autocratic livery companies, the burnings of bad work before the culprit's shop, the pilloryings, fines and imprisonments, but which, generally speaking, by the end of the seventeenth century had completely broken down.

The really creative artist-craftsman was the leader, the initiator of new ideas which seeped slowly through a trade, became stereotyped traditions and remained in use for long periods. To-day, when the tempo of life is speeded up by the machine to an almost intolerable degree so that constant change is called for, even less could the ordinary workman, however skilled a craftsman, be expected to possess the knowledge and authority necessary to the proper evolution of sound forward movements. Here is where the individualist, the artist-craftsman can still come into his own: with his specialised knowledge he can guide trends and movements; if he will accept the machine and all that it stands for as servant and not master of man's needs, he may even become—he *should* become—the designer of prototypes, the arbiter of good taste for the factories which cater for the masses.

We are still too prone, as were the Victorians, to think of craftsmanship in terms of exuberant virtuosity. In most, if not all, ages those in a position to pay for the time involved demanded ostentation. The cleverest exercises in skill of hand and eye became, as a matter of course, first an expression of the might and power of the church and then of individual wealth and social standing. Ruskin drew attention to the decadence endemic in privileged splendour, pointing out that the gorgeousness of the Middle Ages was merely an expression of the pride of the so-regarded superior classes, supported by violence and robbery. In our own time we have seen the less reprehensible but more vulgar magnificence of the industrial aristocracy in which the purveyor of elaborate and ostentatious craftsmanship found so rich a

field, leaving us with a completely false concept of the proper functions of the craftsman.

I come thus by devious ways to the definition that best fits my conception of craftsmanship, which is, very simply: "The well-making of what has to be made, in the service of the community". "Well-making" may be interpreted as:

1. Functional soundness and convenience in use.
2. Suitability of materials.
3. Soundness of constructional methods.
4. Subordination of ornamentation to the foregoing conditions.

It seems to me that the urgent need of our time is to restore the dignity of work and to foster delight in its pursuit and satisfaction in achievement, based on that intimate understanding of materials—whatever they be—from which right use arises. And I visualise this principle as applying not merely within the comparatively narrow range of the remaining handicrafts, but to all forms of making.

It is accepted that monotonous, boring or seemingly useless routine work saps the will to endeavour and engenders a desire for distraction. This panders to the development of preposterous commercialised forms of amusement which have largely destroyed the will to create personal forms of recreation and satisfying occupations. It has also been shown that tedious employment results in actual physical ailments. All this is the direct result of the application of the scientific and inhuman principle to what should be a source of pleasure. But we should remember that there must inevitably be, as there always has been, a certain measure of drudgery—which it is our duty to relieve as far as possible—and a certain proportion of men and women whose capacity and intelligence make them unfitted for the more responsible tasks. We have to rid ourselves of the notion that our gainful occupation, whatsoever it may be, is a distasteful necessity, to be summarily glossed over and rigidly segregated from that other portion of our lives which we conceive to be set aside, according to our lights, to frippery or to "culture". Life, to adapt a phrase, is "one and indivisible". Until we are able to regard work as an integral part of the process of living to the betterment of which it is our inalienable duty to make some contribution, however small, we have no right to grumble at the present unhappy course of events.

The solution to our problems obviously lies not in increased hours of idleness, in stereotyped recreation or organised amusements. It is my belief that a great deal can be done to restore a sense of responsibility and a measure of satisfaction, even in repetitive processes, if imagination and intelligence are brought to bear upon the matter, by inculcating a team spirit, by improving amenities and providing opportunities for varying work and for advancement. By "repetitive processes" I do not necessarily mean machine operating; there is a considerable æsthetic pleasure to be derived from many mechanical operations. I mean any kind of work which seems purposeless or divorced from reality.

But we have to go further than this. Unless man can learn to employ his creative ability, if not in his vocation then during his leisure hours, the outlook is bleak. Let us consider first the vocational possibilities. Some advanced thinkers believe that our industrial system has overreached itself and is doomed; that man's ineluctable fate is reversion to a more primitive life. But cannot we conceive as possible

the circumscription of large-scale industry to the rôle of supplier of the essential "properties" of living: those which, in a given state of civilisation, may be regarded as the irreducible basis of a reasonable standard of life? Now these things can and should provide a background—but no more than a background—of beauty. "Beauty is the radiance which shines from things made as they should be made," said Eric Gill. The beauty of the machine-made essentials will, if they are properly made, be an impersonal, sterilised, inhuman form of beauty, but against this we can set the creative, warmly-beautiful work of human hands, nature's materials, manipulated by man, into which he has projected his own personality, his humanity. In other words the restriction of the machine, within certain limits, would leave a wide field for a great revival of handicrafts, perhaps greater opportunities in every field than ever before.

Those in charge of our education system, at all levels, should recognise the vital need, in this age of superficialities, for a stronger element of æsthetic perception, and should encourage its development in every possible way: especially, I believe through intimacy with the very fabric and fibre of natural materials. Certainly the basis of all technical training should be the hand-processes, even when the student is destined for mechanical production. Our young people must be given the opportunity to become intelligent, knowledgeable, forward-looking men and women, in whom is awakened the latent will to create which, even if no opportunity is provided by the vocation, may find its fulfilment in the so-called leisure hours. Craftsmanship alone can be immensely satisfying but it is also the means of quickening inherent artistry. There is a large measure of truth in Anandra Coomaraswamy's dictum: "the artist is not a special kind of man but every man is a special kind of artist".

What I have said is in no way original: it is merely an eclectic synthesis of thoughts uttered by a number of enlightened thinkers, from William Blake onwards, who could see, all too clearly, the ruin wreaked by the greed and tawdriness of our industrial era—the ruin of man's soul, his divorce from nature and from God.

Now the leather industry can point to an unbroken record of distinguished service through the ages. From long before recorded history the British leather-worker has been, and still is, a provider of everyday necessities, with a degree of skill and artistry comparable with the best in other crafts more famed but less closely linked with life. This applies today even in the case of footwear made almost entirely by mechanical methods.

In the records of this ancient and indigenous craft there are no resounding names to conjure with: there is merely a nameless tradition of fine workmanship. Not that there has been any lack of outstanding master-craftsmen, but what matters more than their forgotten names is the living tradition without which the "great" could not have existed. But I remember with pride and pleasure many contented workmen, such as the foreman of a leather bag department in a London factory who would always accompany a consignment of his products to the warehouse where he would stand for five minutes or so just gazing at them as at well-loved children from whom he could not bear to be parted.

I hope I have shown how successfully the leather craftsman has met the problems of each age with the facilities at his disposal and in the idiom of the time; how he has

preserved unsullied the elements of craftsmanship enshrined in the D. I. A.'s cryptic motto, "Fitness for Purpose".

In spite of the decadence of the industrial era and notwithstanding the competition of many substitutes and alternatives, leather craftsmanship remains inspired and inspiring. That it remains satisfying and that its practice produces workmen as contented as those jovial members of the Gentle Craft, of whom Thomas Dekker wrote, is, to my mind, conclusively proved by the remarkable record, in all sections of the industry, of freedom from strikes and other forms of industrial strife and disturbance. The industry is passing through an exceptionally difficult time and the utmost vigilance and intelligent piloting will be necessary to steer safely between the Scylla of insensitive bureaucratic interference and the Charybdis of indifference to a great and glorious tradition. Our industry now has the great duty and privilege of continuing to minister, in a humane manner, to a world increasingly obsessed with inhuman ideas and devices, rapidly losing touch with nature and with the spiritual values that spring initially from æsthetic experience. The leather industry, in spite of its many faults, and almost certainly without due realisation of its great office, provides an example of rational, humane progress, of that "lively, spreading culture", on which it would do well to ponder. To this sturdy growth with roots deep in the past, with a sense of true craftsmanship unexcelled, great opportunities present themselves. A degree of re-integration, greater recognition of the community of interest, preservation and nourishment of the craft elements, and acceptance of the trained designer as an indispensable member of the team, an interpreter of the rapidly-changing needs of our time, will ensure continuance of the tradition of fine service.

I come then at last to my thesis:

That craftsmanship, which is good workmanship in the service of God and man is, in both vocational and recreational pursuits, the basis of integrity, of creative endeavour and of the satisfaction that begets contentment; that, therefore, a pre-requisite for a successful solution of the social and economic problems of our time is a resuscitation and wide diffusion of the spirit of craftsmanship; that this can only be accomplished through the recognition and the preservation of æsthetic sensibility as a fundamental in our education system; and, finally, that the leather industry provides living proof of the fact that craftsmanship and contemporary methods of production are not incompatibles, in the facts of its age-long, unbroken record of service, of the enduring indispensability of its products in the face of many competitive alternatives, and of its comparatively contented state, and that it is, by reason of these things, a national asset of more than ordinary value.

(The paper has had to be drastically abbreviated owing to limitation of space.)

DISCUSSION

THE CHAIRMAN: I think you will all agree that the lecturer has lived up to our highest expectations and given us a most edifying and enthralling address on this wonderfully interesting subject. He has in fact covered the ground in a most marvellous way—and what a vast ground it is.

One point in the paper which interested me was the reference to the fact that the artist craftsman in the past did not provide the bulk of manufactured goods as many people suppose but that there was division and sub-division of labour resulting in repetition

in quantities of his prototype—in fact, the forerunner of what is now done by machine. In that connexion I was irresistibly reminded of an article which appeared in "Punch" some years ago and which has a bearing on that point. It was on Thomas Chippendale and it said, "Chippendale in his short career (he died at 52) succeeded in making with his own hands no less than 500,000 chairs, 200,000 bureaux, 100,000 tables together with a large variety of other articles of furniture. On the whole, Chippendale was quite a busy man! He was only known to take one holiday and that was when he took half an hour off to get married". I think that that rather explains why we have been shown such very large numbers of genuine (*sic*) Chippendale furniture in our time, and that though very little of it was made by the master craftsman himself, it was repeated in quantities by those supplementary craftsmen alluded to in the lecture.

QUESTION: I should like to ask a question regarding the earliest colouring in leather. There is one book, the Stonyhurst Gospel, which is coloured red. Is there any evidence that this was used at that particular time? The date of the book is A.D. 688 and there has been a lot of speculation as to whether colour was used then on leather or whether the colouring was done later.

MR. J. W. WATERER: The Stonyhurst Gospel, discovered in the tomb of St. Cuthbert, is believed by experts to have been coloured by a very ancient process used originally in Africa. The colouring material was almost certainly kermes, one of the most ancient dye-stuffs later replaced by cochineal which is more concentrated. It is known that the Arabs used it and after they conquered Spain they joined with native craftsmen to produce "Spanish" leather. The leather was first dyed and afterwards processed with a mixture of alum and tin-salts which acted both as a tanning agent and as a mordant for the dye, producing the peculiar brilliant red. It is believed that the book mentioned by the speaker is representative of some such process.

MR. R. W. SYMONDS: I should like to say how interesting Mr. Waterer's lecture has been to me, particularly so because he has differentiated between the craftsman and the artist-craftsman. The craftsman was a man who had sub-division of labour and various restrictions placed upon him by his company or guild whereas the artist-craftsman worked in a studio and was an independent individual. I mention this because to-day there is a feeling that craftsmanship belongs to the artist rather than to the individual, who was a handicraftsman in a traditional period and worked for a wage. I feel that the lecture has brought that particular point out very forcibly and this, I think, is of great interest.

DR. C. H. SPIERS (Leathersellers Technical College): I should like to emphasise that leather seems unique as a material in that it can be made either soft or hard and stiff. It can be soft for making things which have to be flexible, like gloves, and, on the other hand, it is a material which can be given very great hardness for protective purposes. It can, after manufacture, be dyed, stained and embossed and so on, and finished to be soft or hard. There is no other material which has that peculiar range of properties. Rubber has many valuable properties, but once it is made into one of its forms, it is unalterable and you cannot put any surface decoration on it. But in leather you have that wonderful range of possibilities and therefore it is still unique.

It may be interesting to point out that leather is curious in another respect and that is that the old processes of manufacture have remained very much the same throughout the ages until to-day. Even though machines are used to-day, essentially the same sort of processes are still used for the manufacture and decoration of leather, although in some cases somewhat different kinds of chemical compounds are used. I should like to express gratitude for Mr. Waterer's extraordinarily eloquent lecture.

SIR HARRY LINDSAY: I wish to support what our Chairman has said in complimenting Mr. Waterer on his excellent paper, particularly on the fact that he has raised not only questions of craftsmanship in leather but also general principles of craftsmanship,

because that is what makes this paper outstanding in the series of craftsmanship lectures. I also rejoiced in the illustrations which brought out his points. There was only one which went against the grain, though this is a purely personal matter. In the days of my youth I attended a Scottish school where the method of corporal punishment was not the cane but the tawse, and the second of Mr. Waterer's illustrations looked very much like the production of tawse on a wholesale scale!

There is one point I should like to raise: it has been of interest to me for a considerable time. I am one of the people whose job it is to back the natural against the synthetic. I have something to do with Colonial products all of which are natural, and particularly with seeing that the Colonial hides and skins which reach this country are carefully prepared, flayed and cured. We are progressing from the old sun-drying methods to shade-drying and from careless to accurate flaying. I do hope that this labour is not being wasted and that the natural hides and skins which are the raw materials of the leather industry will not be supplanted by the synthetic and plastic materials; and therefore I was glad to see how little Mr. Waterer said about the synthetic leathers. May I suggest as a general principle that the real craftsman will surely seek as his raw materials the natural rather than the synthetic as being the more inspiring and the more conducive to good craftsmanship?

THE CHAIRMAN: I sympathise very much with what Sir Harry said about the tawse for I also was at a school in Scotland and I know what the natural article is though not the synthetic!

It now only remains for me to ask you to accord a hearty vote of thanks to Mr. Waterer for the delightful afternoon he has given us.

The vote of thanks was carried with acclamation and after a vote of thanks had been accorded the Chairman the meeting terminated.

THE DEEP PICTURE PROCESS OF THREE-DIMENSIONAL PHOTOGRAPHY

By C. BUTEMENT, *Research Manager, Deep Pictures, Ltd.*

Thirteenth Ordinary Meeting, Wednesday, February 25th, 1948

Sir EDWARD CROWE, K.C.M.G., *a Vice-President of the Society, in the Chair*

THE CHAIRMAN: It is with great pleasure that I introduce to you our speaker to-day, Mr. Butement, a very distinguished photographer. He has been studying photography for a great number of years and during the war he was doing photographic reconnaissance for the R.A.F. Since then he has worked as research manager of the Deep Pictures Company.

It may be of interest to you to know that nearly 100 years ago M. Claudet lectured in this Hall on the subject of the stereoscope and almost directly afterwards the Photographic Society which had been a daughter of the Society of Arts was formed as a separate society. Stereoscopic photography caused a great deal of interest at that time. I am sure Mr. Butement will give us a lecture which none of you will ever forget, if you are interested in photography. He has promised that when the lecture is over he will answer any questions you may wish to put to him.

The following paper was then read:

It is a great honour to have been asked to talk to you this afternoon about the "Deep Picture" method of Three Dimensional Photography. Now before going into this particular process in detail, perhaps it would be of interest to review briefly the history of stereoscopic photography.

It was 2,300 years ago that the Greek mathematician Euclid first expressed the

theory of binocular vision, when he stated that "To see in relief, is to receive by means of each eye the simultaneous impression of two different images at the same time". All through the intervening centuries, artists have endeavoured to create the illusion of depth by the skilful use of shadows and perspective, but it was not until the evolution of photography, about one hundred years ago, that a practical method of stereoscopic reproduction became possible.

Since that time, many methods have been devised for producing the illusion of the third dimension by photographic means. On the 21st June, 1838, in a lecture given before the Royal Society, Wheatstone expounded the theory of the stereoscope, which he used for viewing stereoscopic pairs drawn by hand. Wheatstone's stereoscope consisted simply of two mirrors set at an angle of 45° to the two drawings which were placed parallel to one another, on each side, so that the reflections of

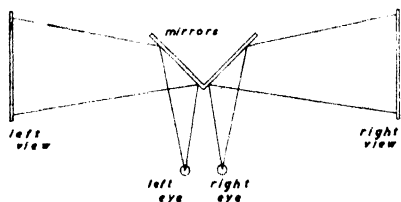


FIG. 1

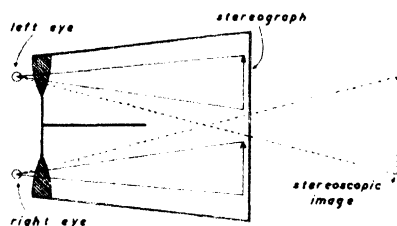


FIG. 2

the two drawings were received by the eyes in such a manner that the left eye saw only the left hand drawing and the right eye only the right hand drawing, thus producing the illusion of depth and satisfying the theory as defined by Euclid. (Fig. 1.)

In 1844 Sir David Brewster constructed the prism, or "Split lens", stereoscope, which is practically identical with those still in use to-day. The prisms, or split lenses, merge the image of the two photographs and give them both the appearance of being at the same point, realising once again the conditions required for stereoscopic vision. (Fig. 2.) In this case the two images are placed parallel and on the same plane to one another, and they can therefore be mounted side by side on a single support to form a stereoscopic pair.

Up to now, we have created the optical illusion of the superimposition of two separate images by the deviation of visual rays, but many other methods are possible for simultaneous vision, by both eyes, of the two images of a stereoscopic pair. For example, if the two photographs are mounted inside a revolvable drum provided with two viewing slits set at the interocular distance (which is normally about $2\frac{1}{2}$ inches), and on opposite sides of the drum, each eye will see only the appropriate image, and persistence of vision will cause the two images to blend, giving the illusion of depth. (Fig. 3.) This apparatus is of particular interest, as it operates by direct vision, and may therefore be considered as the forerunner of methods using grids.

Another method of satisfying the conditions of binocular vision, known as the "Anaglyph", was suggested by Rollman in 1853. In this process the two images of a

stereoscopic pair are printed one on top of the other in complementary colours (red and green for example), care being taken that certain corresponding points of the two images, normally those farthest away in depth, are made to coincide. Since a picture of one pure colour disappears when viewed through a glass of the same colour and is most visible, appearing black through a complementary colour, the two views can be rendered mutually exclusive by means of a pair of spectacles fitted

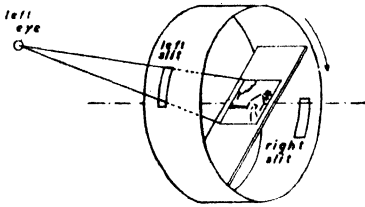


FIG. 3

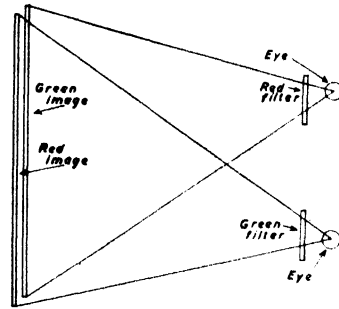


FIG. 4

with red and green glasses. Thus, if the right view is red, the right spectacle must be green. The light areas in each photograph appear in both views, but being in complementary colours, fuse as white. This system has found considerable vogue for the illustrating of magazines and children's books, due to the ease of printing the two images in red and green printing inks and the cheapness of supplying a cardboard viewer fitted with the necessary red and green filters made of coloured gelatine or cellophane. (Fig. 4.)

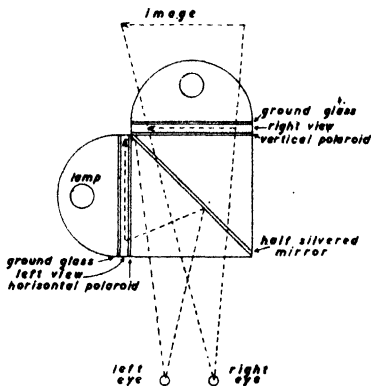


FIG. 5

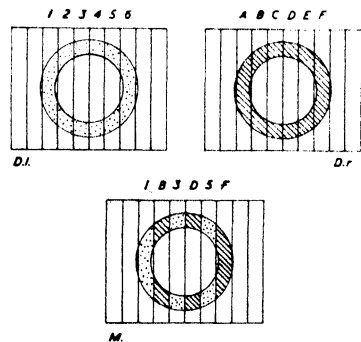


FIG. 6

A more recent method of viewing a stereoscopic pair has been made possible by the introduction of "Polaroid", a material which polarised light. (Fig. 5.) Two sheets of Polaroid, mounted at right angles to each other, cause the light from the two lamps to be polarised horizontally and vertically respectively. The transparencies representing the right and left views are placed between the ground glass and the Polaroid. The mirror, which is set at 45° to the Polaroid sheets, is half silvered,

and transmits one-half of the incident light and reflects the other. Thus, an observer receives the reflected halves of the horizontally and vertically polarised light simultaneously. If the observer is wearing a pair of polaroid spectacles in which the right-hand glass is polarising vertically and the left-hand glass horizontally, the two views are rendered mutually exclusive and stereoscopic fusion results. By this method, several observers may view the prints at one time, and by projecting the two polarised images on to a screen, it is possible to show these stereographs to quite large audiences.

In all the processes reviewed up till now, relief has been obtained with the aid of viewing instruments, separated from the photograph itself. A far more practical solution of the problem is to combine the viewing aid with the photograph itself, and research has been progressing along these lines for some considerable time.

If a stereoscopic pair, formed by the two images D_l and D_r , is divided into narrow vertical bands, 1, 2, 3 . . . and a, b, c . . . and reconstituted into a single image by eliminating the bands 2, 4, 6, of the left-hand image and substituting the bands b, d and f , of the right-hand image, a single mixed image "M" is obtained. If the bands are sufficiently narrow, each of the two composite images will appear homogeneous. (Fig. 6.) If a grid "G" formed of alternate opaque and clear vertical lines is now placed at a suitable distance in front of the mixed image "M" and the combined print viewed from a suitable distance, the left eye will see only the hatched areas 1, 3, 5 . . . belonging to one of the images, while the right eye will see only the dotted areas, a, c, e . . . etc., belonging to the other image, thus again giving the necessary conditions for binocular vision. (Fig. 7.)

In 1903, Frederick Ives of Philadelphia produced stereoscopic photographs in this way, which he called "parallax stereograms", but the grid, then independent from the photograph itself, required very careful positioning. In a later modification,

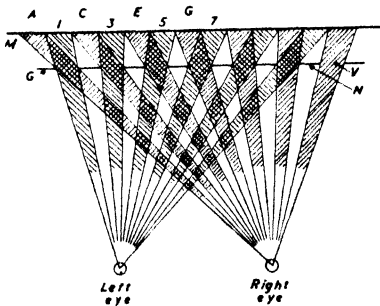


FIG. 7

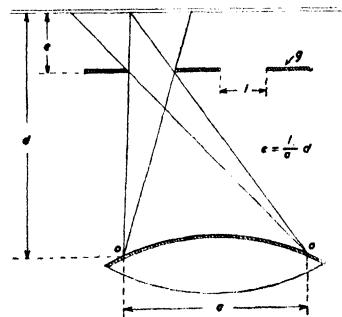


FIG. 8

the grid was printed on the back of the photographic plate, which was reversed in the camera when making the exposure. The camera was an ordinary one with a large diameter lens, covered by a screen perforated with two holes (Fig. 8), separated by the interocular distance "a" and corresponding therefore to the two lenses of a stereoscopic camera. The grid "g" was interposed between the lens and the emulsion,

the position of which was determined by the formula $e = \frac{1}{a}d$. With this arrangement

each of the two holes in the screen projected on to the emulsion the sections of the images corresponding to the two photographs of a stereoscopic pair.

Such photographs will only show relief when viewed from one position and at a definite distance, as a lateral displacement will present to the observer, bands intended for viewing with the other eye, and will result in the visual phenomenon of "pseudo-stereoscopy". In order to obtain a stereoscopic image which is visible from any distance and from any viewing angle, it is necessary to record a considerable number of images, as in this way, in whatever position the observer is placed in relation to the photograph, he will always see one stereoscopic pair, from among the numerous images recorded. This necessitates making the exposures from a great number of viewpoints and requires a grid in which the clear strips are much narrower than the opaque ones. (Fig. 9.) In this way, the necessary conditions for obtaining stereoscopic vision from different viewpoints are realised, but it must be appreciated that the more the images we record behind each opaque element of the grid, the more must we reduce the proportion of clear space to opaque. In view of the lack of luminosity thus obtained, these photographs can only be viewed by means of an extremely strong light placed behind them.

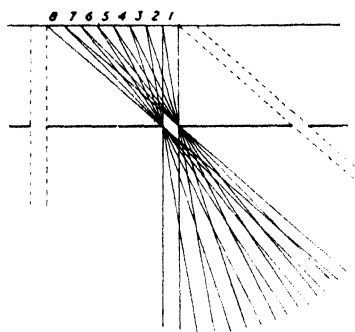


FIG. 9

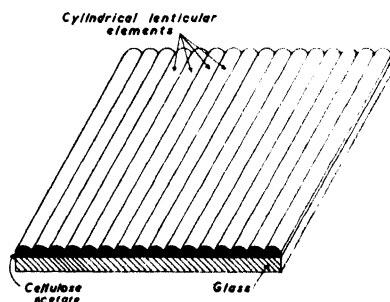


FIG. 10

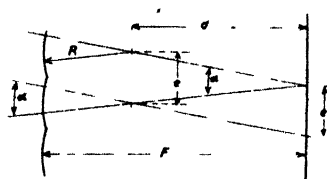
In 1915, Kanolt of Philadelphia took out a patent in which it was proposed to move the camera in the form of an arc around the subject, thus obtaining the continuous exposure of the image through the slits of a grid having an appropriate transversal movement. Two years later, the same inventor proposed the use of a selective cylindrical reseau for use in front of the negative plate, the prints still being viewed by means of a line grid.

About ten years ago, a young French physicist, M. Maurice Bonnet, investigated the possibilities of a cylindrical lenticular grid, which could be used for both taking and viewing the photographs, thus enabling stereoscopic prints to be viewed by reflected light and having substantially the appearance of a normal photographic print, but with the addition of the third dimension. This is the type of grid which is now used in the Deep Picture process. (Fig. 10.) The grid itself is obtained by embossing under heat and pressure, from a metal plate engraved in relief. This

engraving is made by means of precision machinery which cuts into a metal surface, a lenticular cylindrical reseau $4/10$ th of a millimetre wide and consisting of a series of accurately aligned elements, with rigorously defined optical properties.

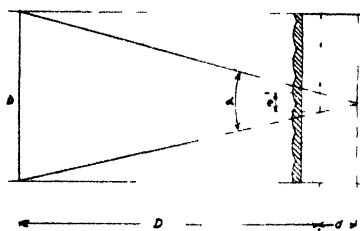
The method of manufacture of these metal matrices is outside the scope of this paper, but the mechanical problems which had to be overcome in order to perfect the industrial manufacture of such engravings will readily be appreciated. Without them the production of stereoscopic photographs, which can be viewed by reflected light, would not yet be possible.

The first grids were manufactured by laminating a sheet of glass and plastic, thus forming a rigid support for the embossing of the plastic. The cylindrical lenticulations are positioned vertically so that they refract in the transverse direction of the image and have no effect in the other direction. They each have a width of $4/10$ th mm. and a radius of curvature of $7/10$ th mm. Their focal length is 2.1 mm. which corresponds with the emulsion layer when the lenticulations are embossed on a glass support having a thickness of 2.0 mm. (Fig. 11.) The latest type of grid, in use is now made entirely from plastic, thus avoiding the use of glass in the



$$f = \frac{PR}{\mu - 1} = 2.1 \text{ mm}$$

FIG. 11



$$D = 2.7$$

FIG. 12

manufacture and resulting in a product which is unbreakable and considerably lighter in weight.

Considered optically, the grid has a number of very interesting properties. If it is placed with its plane surface in contact with a sheet of ground glass, and illuminated by means of a light source at a considerable distance, the rays, which are virtually parallel, will reach each lenticulation at the same angle of incidence and will be refracted at its focal point. This will give rise on the ground glass to a series of bright lines, separated from one another by a series of dark lines, notwithstanding the fact that the grid itself is perfectly transparent. This is, of course, due to the fact that the light striking each lenticular element is concentrated at its focal point. If the ground glass is substituted by a photographic plate and the combined grid and plate is exposed in a camera, a negative will be obtained consisting of very narrow lines of silver, interspaced by clear ones, covering the entire image area, and if this negative is projected with its grid through a lens on to another photographic plate, at the same distance as the original "object-lens" distance, an exact reproduction of the original image will be obtained. (Fig. 12).

This gridded negative is practically analogous to an ordinary photograph, except

—and this is most important—that only narrow strips of the emulsion have been exposed. It has been found in practice, that it is possible to record about twenty different line images behind each element of the grid and it is possible to record successively on the same negative twenty different subjects, each photographed at a different angle to the plate and grid. In the same manner as that previously described, it is possible to extract from this single negative each of the twenty records which it contains.

Stereoscopic photography constitutes a similar problem for the use of these properties of the grid, but, in this case, the negative records in a sweeping movement an infinite number of views of the same subject, corresponding to the different angles of view as the camera is rotated in an arc around the subject.

From the mathematical point of view, it is interesting to record the following points concerning cylindrical lenticular grids. That used in the Deep Picture process is made up from a plastic of refractive index 1.40, and of glass, the index of which is 1.52. This gives for all practical purposes a combined refractive index of 1.50. The lenticular elements constitute semi-cylindrical di-opters, their known formula being:—

$$F = \frac{\mu R}{\mu - 1}$$

Where μ is the refractive index, R the radius of curvature ($=0.7$ mm.) and F focal length of lenticular elements (therefore $=2.1$ mm.).

The angle of view of the elements is calculated as follows. The light rays which pass through the optical axis of each element are obviously not deviated and the effective angle of view of each lenticulation is therefore equal to the angle formed between them by two incident rays passing through the optical axis of the same element and meeting on the focal plane the corresponding rays of the two adjacent lenses. The following equation can be given:—

$$\operatorname{tg} \frac{\alpha}{2} = \frac{\frac{e}{2}}{d}$$

and from this it can be calculated that the angle of view α is $16^{\circ} 8'$ or for all practical purposes 16° .

In order that the entire area of emulsion behind each element be fully exposed without overlapping of the images, it is necessary that the strip exposed through each lenticulation be exactly equal to the width of the lenticulation—in other words, the angle of acceptance must be equal to the angle of view of the lenticulations, in this particular case, 16° .

Let us examine the conditions obtained in practice, when a photograph is taken using the type of camera which describes an arc around the subject during the course of the exposure. The solid lines in Fig. 13 represent the starting position of the camera, and the dotted lines the position at the end of its run. During this time the photographic plate and grid remain parallel to one another and the angle through which the camera is displaced is equal to the angle of view of the lenticulations. By mechanical means, it is possible to give the grid a greater or lesser angle

of rotation than that which the camera makes around the subject, but as the rotation angle of the grid must remain constant in relation to the optical axis of the lens, in practice, it is the rotation angle of the camera which is varied. Thus, if this angle is reduced less stereoscopic effect is obtained and if it is increased, an exaggerated effect is obtained. Figure 14 drawn to a larger scale illustrates the effect of any lenticulation of the grid at its two extreme positions and shows the phenomenon of the continuous sweep of the emulsion by the light rays.

At the beginning of the camera movement the rays from the subject reach the lenticulation "a" of the grid, for example; the vertical image of the subject corresponding to the width of this lenticulation is, as we have seen, focussed on to the

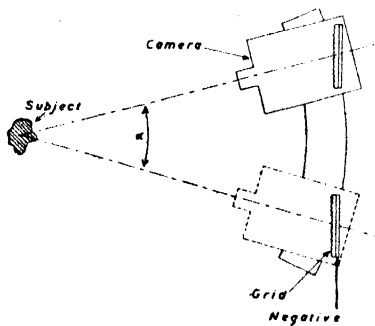


FIG. 13

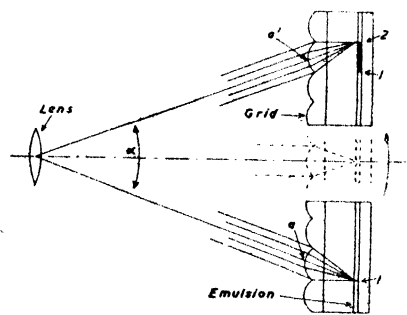


FIG. 14

emulsion, where it forms a vertical line 1. At the end of its movement, the lenticulation "a" will have arrived at "a'", and the image formed by it will therefore be at point 2 on the emulsion. In the intermediate positions of the apparatus during its movement, all the emulsion area between 1 and 2 will have been exposed progressively.

Although the period of camera movement is in practice equal to about two seconds, each of these lines, which we have estimated as equalling twenty behind each lenticulation of the grid, is only exposed for approximately $1/20$ th of the period of movement, that is to say, for $1/10$ th of a second. The subject is therefore not obliged to remain completely motionless for two seconds as if movement occurs, a photograph in relief but with slight animation will be obtained.

The exposed negative plate is removed from the dark slide and developed in the usual manner, and a contact print is made on to a special type of non-stretch bromide paper, and registered in contact with a similar grid to that used in the camera. An observer examining the photograph from any position can see only one image behind each lenticulation. (Fig. 15.) Thus, his left eye will see the vertical line "g¹" as far as the lenticulation "C" is concerned, and the vertical line "g²" for the lenticulation "C¹". The right eye of the same observer will see at the same time behind each lenticulation different image lines, for example, the line "d¹" for lenticulation "C" and line "d²" for lenticulation "C¹". A complete image is thus formed by the total of the simple lines of which the photograph is composed, but

whereas in ordinary stereoscopic photography only two images are used, in this case it will always be pairs of different images which the eyes will see from any viewpoint. That is the reason why the impression of turning around the subject is obtained.

A last point needs to be defined. One may be surprised that these photographs, which are in fact constituted by an infinite number of broken vertical lines, do not present a striated appearance. The explanation is that the image lines, being at the focus of the lenticulations of the grid, give rise to parallel bands of equal width to the lenticulations. In other words, when examined, each line becomes a band juxtaposed exactly to adjacent bands and the reconstituted image is therefore homogeneous.

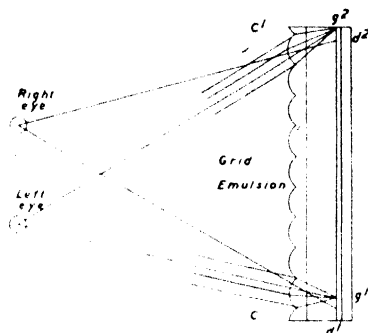


FIG. 15

Several types of camera have been used to produce stereoscopic photographs by this process.

1. For the photography of small objects, such as insects, a special type of camera is employed in which the lens remains stationary during exposure, and the object is revolved on a turntable and at the same time, the plate holder is pivoted through an angle of approximately 16° . Magnifications up to seventy times have been obtained by this method.

2. For portraits and similar work, a camera with a single lens moving laterally on a circular support is employed. This is the type which was previously discussed in some detail. It consists of a shutter which opens automatically at the beginning of the run and closes at the end, the camera producing a continuous exposure of images during this time. The grid, which is permanently mounted in the plate holder, is in contact with the negative plate, and both remain parallel due to an automatic coupling on the camera mechanism. All the electrical, focussing and lens displacement controls are placed at the back, with the exception of the camera operating switch, which is hand held and may be operated from any position in the studio.

3. For instantaneous and outdoor photography requiring great depth of focus, a new type of camera is being developed, which consists in effect of six or more small cameras placed side by side, each fitted with a normal anastigmat lens. The lenses are placed at intervals of $1\frac{1}{4}$ inches to 3 inches apart, according to the distance of the subject from the camera, and a negative consisting of six or more images placed side by side is obtained at one instantaneous exposure. In practice, it has been found

that six negatives are sufficient in order to obtain a homogenous image, when they have been successively printed, by projection, through a lenticular grid.

With these types of apparatus, stereoscopic photography can now take its place in the various photographic fields and has already been successfully used in this country and in France for the production of portraits, commercial illustrations and advertising, as well as in medical photography and for educational purposes. The process lends itself to the adaptation of colour photography, and as soon as supplies of colour materials are available Deep Pictures in full depth and colour will be an established fact.

DISCUSSION

Mr. P. L. de LASZLO: I should like to congratulate Mr. Butement on having dealt so lucidly with such a complicated subject, but there was just one point which I could not follow. As I understood it, when the finished photograph is viewed, the pair of eyes may rotate round it in an arc in the same way as the camera rotates round the subject. If the radius of the viewing arc is different from that of the taking arc I should have thought the two images selected by the eyes might not be a stereoscopic pair. When I have seen deep pictures—and I have seen them on various occasions both at the exhibition given by the lecturer's company and in shop windows—I have tested this by moving backwards and forwards and I have always seemed to get some kind of stereoscopic effect. I should be interested to know if Mr. Butement can explain that illusion, which occurs although the viewer may not be viewing the picture at the correct, *i.e.*, at the theoretically only possible, position.

Mr. C. BUTEMENT: I think the answer is that, whereas with a normal stereoscopic pair the left eye must see one image and the right eye the other and not see them in reverse, in a deep picture where you have 20 images, if you are looking at the extreme right-hand image, it becomes the right-hand image for the pair, and the next image the eye picks up is the left-hand image. If you move across the left-hand image becomes the right-hand image, the next one the left-hand one, and so on. Thus you keep on picking up these pairs from whatever angle you are viewing.

Mr. de LASZLO: But they are not necessarily corresponding pairs?

Mr. C. BUTEMENT: No, they may be any two pairs because each is separated by a given distance from one another in the taking. You can pick up any one of the 20 pairs and they can be reversed so that the left-hand one becomes the right-hand one and the next one becomes the left-hand one, and so on.

Mr. de LASZLO: So that on the distance away that the viewer stands will depend the degree of stereoscopy or hyper-stereoscopy?

Mr. C. BUTEMENT: Yes, the degree of stereoscopy will vary. If you view the picture from too great a distance you will not get the full stereoscopic effect. From 20 feet or 30 feet you begin to lose it.

QUESTION: Can the same technique be applied for producing stereoscopic moving films?

Mr. C. BUTEMENT: The difficulty of applying this particular principle is that if the gridded image formed by the lenticular screen in the camera is not exactly the same size as the grid used for viewing, then the stereoscopic effect is not obtained. Therefore, for any motion picture process based entirely on these lines it would be impossible to obtain perfect registration of the enlarged image on the screen. If you used a large lenticular

screen in place of the normal cinema screen, the stretch of the print would be too great to allow register of the image with the screen. We are at the moment limited to using glass plates for negatives because of this stretch problem.

QUESTION: I should like to ask if there is any possibility or prospect of producing a lenticular grid, not printed but reproduced in numbers, so that one might introduce it into a publication.

Mr. C. BUTEMENT: We are doing a considerable amount of research on those lines. The present difficulty with the existing type of grid is that it has a fixed thickness of 2 mm. between the lenticular elements and the image and if this thickness were reduced it would reduce the stereoscopic effect. We are, however, doing work on those lines and I hope we shall be able to produce magazine illustrations. The main problem with the existing grid—which could possibly be used as the cover for a catalogue—is the problem of the paper print stretching underneath.

QUESTION: What is the reason for the sensation of flicker which occurs when one moves one's head from side to side? There is a sensation of jumping.

Mr. C. BUTEMENT: The jumping effect is due to the displacing of individual pairs of images as you lose one pair and pick up the next.

QUESTION: You mean moving more than 16 degrees?

Mr. C. BUTEMENT: No, you get a slight jump when you move right across, due to the displacement of the images. If the subject is all on one plane, you get no jumping at all, but if you have an object well in the foreground or well behind the main plane, then you obtain a displacement effect as you walk around the print.

The flicker is something which we are overcoming now to a large extent, but is due to the divisions between the lenticular elements.

It is very difficult to produce a 100 per cent. optically perfect grid.

Mr. L. DUDLEY: I have been associated with the development of pictures of this kind for nearly 20 years, and I have, therefore, appreciated the lecture very much indeed. What I am going to say must not be taken as a criticism but only as a suggestion. I think it might have been of greater interest if we had been given more information about some of the earlier work, particularly that done in the period between the days of Wheatstone and the recent advent of Deep Pictures, Ltd. For example, in 1915, Kanolt developed and patented the use of cylindrically lenticulated grids for both taking and viewing stereoscopic pictures of the parallax panoramagram type. Moreover, the basic principle of the particular type of camera shown by the lecturer in Fig. 13 was evolved and patented by Gustave Bessière in 1924. I noticed that there was a reference to Maurice Bonnet but none to Gustave Bessière.

Mr. C. BUTEMENT: Yes, that is quite true. There are so many different references which could have been quoted in this lecture but most of them have been recorded at various times. My lecture was intended to be mainly on the present process with just a brief historical review leading up to that process. It would have taken 10 or 12 hours to deliver if I had mentioned all the work done on the subject. It was difficult to know how much to condense.

THE CHAIRMAN: I think the time has come for us to pass a hearty vote of thanks to our lecturer. It is obvious from the series of extremely intelligent questions that you have appreciated the lecture and Mr. Butement has been very good in answering all your points. I will ask you to join with me in according a very hearty vote of thanks to our lecturer.

The vote of thanks was carried with acclamation, and the meeting then terminated.

GENERAL NOTES

PAUL NASH EXHIBITION.—The retrospective exhibition of a hundred and fifty oils, water-colours and drawings by the late Paul Nash at the Tate Gallery enables us to judge his stature as a great imaginative painter of our time, with something of Blake's mysticism, and to observe his development from the years immediately preceding the first World War to the time of his death two years ago.

"Development" is perhaps hardly the word for so restless an experimentalist as Paul Nash. Beautiful essays in atmosphere though his early pen and wash drawings are—the "Bird Garden" studies are quite lovely—there is in them, as yet, no hint of the astonishing powers he displayed as an official artist on the Western Front during the first World War. From that period he unquestionably emerges as one of the great triumvirate of War artists, the other two—very different in style and outlook—being, of course, Orpen and Nevinson. Yet, while his magnificent chalk drawings on brown paper—"Sanctuary Wood" and "Broken Trees, Wytschaete", for example—are authentic records of his experience and convey a powerful sense of desolation, his canvases often lack coherence, and the great "Menin Road"—conceived as a drama, and carrying as little conviction as a melodrama of battle—allows no rest to the eye. "Night on the Ypres Salient", on the other hand, while undeniably theatrical, is a more satisfying composition; but not until the late War years was Nash able to achieve, with remarkable consistency, unity of design and to invest his pictures—particularly the studies of wrecked aircraft—with an uncanny sense of disillusion.

Nevertheless, one returns again and again to his records in chalk and water-colour of the shattered landscapes of the first War, and one could wish that many more examples of this period had been procured from the Imperial War Museum and elsewhere.

In the interval between the Wars, Nash became obsessed with problems of perspective and the relationship of inanimate objects, and at times—as we see in such paintings as "Circle of the Monoliths"—he comes close to the Surrealists. A certain aridity of colour is apparent in his more austere constructions, and in his restricted range of colours he employs few tones beyond a biscuit and blue-grey. But even when his designs are reduced almost to abstractions we are aware of the sincere purpose of a highly imaginative mind; and serious students of his art will gain from illustrated monographs, and a thoughtful article, in the current number of *The Studio*, an insight into the philosophy which inspired this more difficult phase of the art of Paul Nash.

N. A. D. WALLIS.

INTERNATIONAL COMPETITION FOR LOW-COST FURNITURE DESIGN.—The New York Museum of Modern Art, together with a non-profit making American organisation, Museum Design Project, Incorporated, have organised an international competition for designs for furniture for present-day small homes. Two kinds of design are eligible: seating units for one or more persons, and storage units for household or personal effects or both. The first of three prizes is for \$5,000, and an international jury has been appointed which will include Mr. Gordon Russell, C.B.E., M.C., R.D.I.

Notification of intention to enter the competition should be sent to Edgar Kaufmann, Jr., Director, Department of Industrial Design, Museum of Modern Art, 11 West 53 Street, New York 19, U.S.A., who will forward full details of the competition.

NOTES ON BOOKS

BOTTICELLI: THE NATIVITY. Introduction by John Pope-Hennessy. Gallery Books, No. 15. Lund Humphries. 4s. 6d.

Mr. Pope-Hennessy's introduction to Botticelli's great religious canvas in the National Gallery is one of the briefest, and unquestionably one of the finest, contributions to a series of papers notable for their lightly-carried scholarship. He has rare æsthetic sensibility, profound knowledge of the Italian language, a gift for presenting historical

facts lucidly (and this "Nativity" cannot be considered without reference to the troubled history of the time) and a style which combines dignity with eloquence: in short, he has all the gifts necessary for an authoritative examination of a masterpiece crowded with symbolic figures, and directly inspired by the Florentine beliefs of the period.

While it is undeniable that Botticelli's picture, painted in the year 1500, is a masterpiece—one need look no further than at the miraculous kneeling figure of the Virgin for proof of his supreme craftsmanship—it is possible to maintain that the canvas does not give the immediate satisfaction that Botticelli's simpler compositions afford, for the wealth of incident tends to distract the eye from the scene of Adoration. ("The Immaculate Conception" by Velazquez may be criticised on similar aesthetic grounds—the symbolical detail with which the background is loaded, in order to make the picture an object of devotion, diverting attention from the central, beautifully painted figure.)

But though the significance of the various details of the "Nativity" requires interpretation, and the picture accordingly presents problems more interesting to the art historian than the ordinary art lover, everyone must acknowledge the nobility of a great spiritual painting conceived in terms of line. "Always a supreme master of line", Mr. Pope-Hennessy rightly observes, "Botticelli in his late works expresses his emotions through linear emphasis". Thirty years ago the late Frank Rutter remarked: "Why, alike in Italy, Flanders, and far distant China, *line* should invariably be associated with the most spiritual paintings the world possesses, is a conundrum I have not the courage to attempt to answer". It does not lie within the scope of Mr. Pope-Hennessy's essay to attempt an answer, but this "Nativity" is evidence of the truth of the assertion.

Let us examine the picture. Below the thatched roof of a pent-house, which stands on rocky ground, kneels the Virgin beside the Holy Child. To the left and right are kneeling figures, each group attended by angels. In the foreground we find three men, holding sprigs of olive, embraced by three angelic figures. On the pent-house roof there kneel three more angels also holding sprays of olive, while a chain of angels sing praises in the Vault of Heaven. This is no orthodox "Adoration", and the key to the symbolism is provided by an inscription in Greek characters, which cannot be understood without knowledge of contemporary circumstances. For the legend refers to the second woe of the Apocalypse, and the martyrdom of Savonarola three years previously augured a speedy fulfilment of the apocalyptic revelation when the devil had been chained and peace once again established through a regenerated church. This, Mr. Pope-Hennessy reminds us, was the view entertained by Botticelli when he painted the "Nativity"; and his interpretation of the picture, with reference to this and other guides to the artist's intention, constitutes one of the most admirable parts of his essay. "Time has heightened the human no less than the æsthetic appeal of the 'Nativity'," he says in conclusion; "and to-day, perhaps more fully than at any period since the painting was conceived, we find ourselves in sympathy with the paean in praise of peace of mind, to which a great artist committed his distress at the suffering around him, and through which he affirmed his faith in miracles to come".

N. A. D. W.

"DESIGN THIS DAY", by Walter Dorwin Teague; The Studio Limited, London, 35s.

This volume is not only the most important and interesting, but also the most thoughtful and scholarly work on the subject of Industrial Design, for the author has so great a background of historical knowledge combined with modern practice and experience, that he would seem to be an unrivalled authority. As an example of his background one notes his appreciation of the æsthetic achievements of the Greeks, which leads him to conclude that, without machines and without a mechanical bent, they attained to a "machine-like" quality by means of their intense appreciation of the fineness of exact relationships. For him the Parthenon is a masterpiece of idealised mechanics and his book contains an important appendix on the "Proportional Scheme of the Parthenon". The author examines the past in order to explain the present and

opens up a vista in which the machine is subjected to the service of humanity, and its use directed to man's development.

There are schools of architecture which almost up to the present day have divided their attention between technical details of construction and an intensive but superficial devotion to the history of architectural forms—columns, capitals, cornices and mouldings, and their careful delineation. There has, however, also been reaction from this "playing with period styles", and the reaction has produced "Modern" or "International" schools of architecture which regard the past as an evil influence to be avoided at all costs. Teague maintains that the period for such rivalries must pass. What matters most in design is the Mind which evolves or creates the design. It must never be our wish slavishly to imitate the methods or styles of the past; but it must be our aim to emulate the quality of things made in the past; and for this reason alone knowledge of these things is in itself desirable. "Our aspirations", he says, "may be better defined than those of our ancestors, and certainly they are different, but I doubt if they are higher. Our effort to-day is continuous with the effort of the past. Unless we appreciate the continuity of our racial aspirations and tap the reservoirs of racial experience, we shall be hopeless bunglers. There is no time and we are not big enough to treat design as if we had invented it".

Not only engineers and architects, but lovers of the Fine Arts, are bound to gain satisfaction from this volume, which welds into a single intelligible æsthetic philosophy one's love for ancient Greek fineness and precision and one's admiration for such works of art as a great modern bridge or a perfectly stream-lined car. The need for partnership between engineering and design is of sufficient importance to call for serious consideration from Scholarship and Industry working together.

In this book the author has made a great contribution to the understanding of the problems of the age, as well as an approach to their solution, which, in a troubled world, offers hope. The production of the book and the quality of the illustrations are both extremely good.

CHARLES SELTMAN.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORNIGHT

WEDNESDAY, MARCH 31. Foundrymen, Institute of British, at the Waldorf Hotel, W.C.2. 7.30 p.m. W. A. Turner, "Production Planning for the Foundry."

Radio Engineers, British Institution of, at 24 Dale Street, Liverpool, 2. 6.45 p.m. J. B. Birks, B.A., "The Physical Application of Micro-Waves."

Regent Advertising Club, at the Royal Society of Arts, W.C.2. 6.30 p.m. Mrs. C. E. Tampley, "Design then Advertise."

THURSDAY, APRIL 1. Electrical Engineers, Institution of W.C.2. 5.30 p.m. R. J. Halsey and J. H. Swathfield, "Analysis-Synthesis Telephony with special reference to the Vocoder."

FRIDAY, APRIL 2. Atomic Scientists Association, at the Royal Society of Arts, W.C.2. 7 p.m. Professor H. S. W. Massey, "International Control of Atomic Energy."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. H. A. Prime, "High-Speed Recording of Optical and Electrical Transients."

Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. L. H. A. Carr, "Some Recent Advances in Silence."

Photographic Society, Royal, at 16 Princes Gate, S.W.7. 6.45 p.m. Mrs. Doris Keiller, "Colour and Colour Vision."

MONDAY, APRIL 5. Electrical Engineers, Institution of, at the Neville Hall, Newcastle-on-Tyne. 6.15 p.m. M. E. Haime, "Design and Construction of a New Electron Microscope."

Farmer's Club, at the Royal Empire Society, W.C.2. 2.30 p.m. Dr. T. Dalling and Dr. A. W. Stableforth, "Bovine Mastitis."

Geographical Society, Royal, S.W.7. 8.15 p.m. John Lawrence, "The Russian Land and History."

TUESDAY, APRIL 6. Chemical Engineering Group, at the Geological Society, W.1. 5.30 p.m. J. G. Pearce, "Recent Developments in Cast Iron."

Decorators, Incorporated Institute of British, at the Royal Society of Arts, W.C.2. 6.30 p.m. Sir Thomas P. Bennett, "Contemporary Decoration in America, Sweden and Switzerland."

Electrical Engineers, Institution of, at the Engineers' Club, Manchester. 6 p.m. E. M. Johnson and C. P. Holder, "The Design of Large Vertical-shaft Water-Turbine-Driven A.C. Generators."

Kuematograph Society, British, at the Geographical Society, Manchester. 10.30 a.m. R. Robertson, "Projection Equipment."

At the Neville Hall, Newcastle-on-Tyne. 10.30 a.m. H. E. Whitney, "Kinema Engineering Efficiency."

Mechanical Engineers, Institution of, at Storey's Gate, S.W.1. 6 p.m. P. de K. Dykes, "Piston Ring Movement during Blow-by in High-Speed Petrol Engines."

WEDNESDAY, APRIL 7. Photographic Society, Royal, at 16 Princes Gate, S.W.7. 7 p.m. F. W. Knight, "Pictorial Architectural Photography."

THURSDAY, APRIL 8. Electrical Engineers, Institution of, at the Guildhall, Southampton. 7.30 p.m. P. Dunsheath, "Electricity and Everyman."

Physical Society, at the Royal Institute of British Architects, W.1. 5.45 p.m. Hope Bagenal, "The Use of Microphones and Loudspeakers in Building, and Sound Amplification and Distribution."

Radio Engineers, British Institution of, at the London School of Hygiene, W.C.1. 6 p.m. W. S. Barrell and G. E. Dutton, "High Fidelity Recording and Reproduction."

FRIDAY, APRIL 9. Engineering Draughtsmen and Designers, Institution of, at the Royal Society of Arts, W.C.2. 7 p.m. R. J. Davies, "Angular Contact Ball Bearings."



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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4766

FRIDAY, APRIL 9th, 1948

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

MONDAY, APRIL 12TH, at 4.30 p.m. (*First of three Cantor Lectures*).—"RECENT ADVANCES IN ANAESTHESIA", by Frankis T. Evans, M.B., B.S., D.A. The Course will be illustrated by lantern slides. (See syllabus below.)

WEDNESDAY, APRIL 14TH, at 2.30 p.m.—"DISTRICT HEATING", by Henry S. Horsman, M.I.MECH.E., A.M.I.E.E., F.INST.F., of the London Power Co., Ltd. Alfred C. Bossom, F.R.I.B.A., M.P., a Vice-President of the Society, will preside. The paper will be illustrated by lantern slides.

MONDAY, APRIL 19TH, at 4.30 p.m.—Second Cantor Lecture by Dr. Frankis T. Evans.

TUESDAY, APRIL 20TH, at 2.30 p.m. (Dominions and Colonies Section).—"THE EAST AFRICAN GROUNDNUTS SCHEME", by A. J. Wakefield, C.M.G., B.Sc. Sir Peter D. Macdonald, K.B.E., M.P., will preside.

WEDNESDAY, APRIL 21ST, at 2.30 p.m. (*Trueman Wood Lecture*).—"THE STRUCTURAL RELATIONSHIPS OF SOME PLANT PRODUCTS", by Sir Robert Robinson, M.A., D.Sc., P.R.S., Waynflete Professor of Chemistry, University of Oxford. Sir Harry Lindsay, K.C.I.E., C.B.E., Chairman of Council of the Society, will preside.

SYLLABUS for three Cantor Lectures on Anaesthesia by Dr. Frankis T. Evans.

Lecture I.—The history of inhalation anaesthesia. (Monday, April 12th.)

Lecture II.—The theory of anaesthesia—ether and chloroform—early apparatus—
inhalation anaesthetics—the signs of anaesthesia. The anaesthetic gases—apparatus. (Monday, April 19th.)

Lecture III.—Endo-tracheal anaesthesia—local, regional and spinal anaesthesia—
intravenous anaesthesia—rectal basal narcosis—Curare—combination or balanced
anaesthesia—the old and the new. (Monday, April 26th.)

THE ALBERT MEDAL

The Council will proceed to consider the award of the Albert Medal of the Royal Society of Arts for 1948. They therefore invite Fellows of the Society to forward to the Secretary the names of such men of high distinction as they may think worthy of this honour. The medal was struck to reward "distinguished merit in promoting Arts, Manufactures and Commerce". A list of previous recipients appeared in the *Journal* of March 26th, 1948.

EDUCATION FOR MANAGEMENT

By LIEUT.-COL. L. URWICK, O.B.E., M.C., M.A., Deputy Chairman, British Institute of Management.

Tenth Ordinary Meeting, Wednesday, February 4th, 1948, at 2.30 p.m.

The Right Hon. R. A. BUTLER, M.A., M.P., *in the Chair*

THE CHAIRMAN: It gives me great pleasure to take the chair on this occasion and to introduce Colonel Urwick to you. I think that the very minimum of words is necessary in view of his great reputation, and in view of the excellent report which the Urwick Committee produced. There is a stage in the affairs of men when their names become associated with the name of a Committee. I have never yet had that honour myself, because I have usually been the person who has appointed Committees, so that I have been rather jealous of those who have appropriated the name of a Committee for themselves. In this case, however, the honour is very well deserved. We have here the main inspirer of the Urwick Committee.

He is a very human person, and humanity is most important in this question of management. I recently had the opportunity of attending a ceremony in Manchester in his company, when we each had the honour of being made an Honorary Associate of the Manchester College of Technology. I had every opportunity there of appreciating, even more than I had been able to do from the somewhat formal pages of his report, the very human characteristics of his own personality.

It is therefore to me a great personal pleasure to be present to-day. I am also glad because I think that this subject of management is not only fashionable but also important. It is rare that fashion and importance go together. It is with great pleasure that I introduce Colonel Urwick to you and ask him to read his Paper.

The following Paper was then read:

Some centuries ago the Chinese philosopher Confucius was discussing with his disciple Tsu Lu this question of management which is before us to-day. "Sir", said Tsu Lu, "the Prince of Wei is waiting for you to assume the administration. What will you do first?" The Master Confucius said "The essential thing is to rectify the use of terms." Tsu Lu said, "What, Sir! You are speaking off the point. What has such a rectification to do with government?" The Master said, "How unmannerly you are, Lu! When a man of breeding comes to anything he does not understand, he more or less blames himself. If names be not used correctly, then speech gets tied up in knots: and if speech be so, then business comes to a standstill."¹

Our title contains two terms. The first is one on which many volumes have been written. Education is a subject peculiarly susceptible to that discontent which, we are told, is divine, and to that conviction, which is so emphatically human, that "things are not what they used to be." However, for the purpose of this discussion it is sufficient to rely on one of our greatest living authorities on the subject, Sir Richard Livingstone:

"All men need to make a living—not a bare one, but the best that conditions allow. All men live in a society. All men have a personality to develop and the power of living ill or well. For all these education must provide, and it must therefore include a vocational element, a social, or as the Greeks would have called it, a political element and a spiritual element. Men

¹ E. R. Hughes "Chinese Philosophy in Ancient Time".

must learn to earn a living, to be good members of a society and to understand the meaning of the phrase 'the good life'; and education must help them to achieve these three ends."²

We need not look further for a comprehensive definition of what is meant by the word "Education".

Management is a more difficult term. The Concise Oxford Dictionary defines it as "In verbal senses; also or especially, trickery, deceitful contrivance; the *management*, governing body, board of directors". If this definition is accepted, it would seem that a course in the morals of Captain Macheath is the only preparation necessary for those destined to sit in the seats of the industrial mighty. But though the "Beggars' Opera" should undoubtedly be one item in any liberal education, it hardly appears, in isolation, to meet all requirements.

The committee which reported last year on "educational facilities required for management in industry and commerce" said "by 'management' in this context we understand all those activities involving responsibility for the work of others."³ The Committee on Higher Technological Education which reported in 1945, said about "management studies"—"admittedly there is much in this field which can be learned only from experience, but there is a body of knowledge awareness of which may greatly facilitate the process of learning."⁴ The first committee examined the phrase "management studies" in some detail. It pointed out "that there is nothing new in the idea that management should be the subject of theoretical study."⁵ "What is new is the treatment of this subject scientifically with emphasis on inductive methods."⁶ "In the (past) thirty years . . . there has been built up a very large body of knowledge bearing upon" the six main activities of management, namely, forecasting, planning, organising, commanding, co-ordinating and controlling, and "irrespective of the field of industry to which they are applied."⁷ This body of knowledge is "distinct from any detailed understanding either of the process of the particular industry or of the various skills and services which are themselves indispensable tools for the conduct and regulation of a complex organisation."⁸

These quotations emphasise the great difficulties of this term and the necessity of precise definition if what Mrs. Malaprop so aptly called "the nice derangement of epitaphs" is to be avoided. The word *management* is properly used of the activity, managing. But there is also a body of knowledge bearing on the activity, to which the word *management* is often applied. Then there is the conception of the activity in the abstract; the late F. D. Roosevelt once wrote, "a government without good *management* is a house built on sand"⁹, that was in introducing to Congress the report of the President's Committee on Administrative *Management*. We find David Lilienthal, formerly Chairman of the Tennessee Valley Authority, writing

² "Education for a World Adrift", p. 46.

³ "Education for Management", H.M.S.O. 107, para. 2a.

⁴ "Higher Technological Education", 1945, para. 71.

⁵ "Education for Management", para. 7.

⁶ *Ibid.*, para. 8.

⁷ *Ibid.*, para. 9.

⁸ *Ibid.*, para. 10.

⁹ Report of the President's Committee on Admin. Management, 1937—Letter of submission to Congress.

"this failure to recognise the importance of principles of modern *management* in public affairs may bring upon us the gravest consequences in the near future."¹⁰ On the other hand, in this country the word is often used to distinguish between the government of business, "*business management*", and the business of government, "*public administration*".

Turning back to the Concise Oxford Dictionary we find *the management* used to describe the governing body or board of directors. But many years ago, Mr. Oliver Sheldon drew a sharp distinction between *management*, the executive function and *administration*.¹¹ He pointed out with considerable force the reasons why a board as such should not attempt to *manage*. Yet again, the word is used in such phrases as "*the management and the workers*" as a synonym for ownership or the employer. Though in fact the vast majority of managers are not owners or employers and are in precisely the same economic relation to ownership as are the workers.

Nor is this discussion of terminology academic and theoretical. One of the greatest causes of economic waste, which it is a matter of life and death to this country to avoid, is the time expended on useless and often very pompous disputation—disputation which is not about real things at all or even about any fundamental difference in ideas. It is disputation which arises from the fact that those concerned are using the same word with totally different meanings. In short, Confucius was right "If speech gets tied up in knots . . . then business comes to a standstill."

For our present purpose the most important distinction is that between *management* as an activity and *management* as a body of knowledge. The exact wording of the title—Education *for* Management—implies that we are discussing an activity. It is possible to educate an individual *in* a body of knowledge, but not *for* a body of knowledge. The question before us is not what form of education is best calculated to secure that the student has a comprehensive understanding of the body of knowledge described as management. It is the much more far-reaching question—What form of education is best suited for those who, later in life, may be called upon to perform managerial functions?

This is not a distinction without a difference. There is a very great difference between the two questions. The first is a question of the technique of pedagogy, how best to impart a given body of knowledge. It is not concerned with what the student does with that knowledge when he has acquired it. It has no reference to practice. It is concerned merely with conveying information of a certain kind. The second is a wider and more difficult question. It is concerned with the whole development of the individual who may be required to discharge a very responsible task. What pattern of development, what form of progressive instruction, what items of knowledge out of the vast range of available knowledge are best calculated to secure that the individual who may be asked to guide the work of others knows what he should know, can find out what he doesn't or can't know, can use his knowledge effectively, that is to say, has been taught to think, and, perhaps most important of all, can so shape his guidance that those others are satisfied to accept it?

¹⁰ "T.V.A. Democracy on the March", Penguin Edn. p. 155.

¹¹ "The Philosophy of Management".

Turning back to Sir Richard Livingstone's definition of education it really involves three separate questions: First, what form of education is appropriate to meet the vocational demand that a man or woman should be technically equipped to be a good manager? Second, what form of education which meets the first demand can, at the same time, provide for the second, namely, that it shall equip the individual to be a good member of society? Third, what form of education, which satisfies both the first and the second requirements will, simultaneously, develop the personality so that the individual is enabled to lead "the good life?"

Much of the controversy which rages, and is destined to rage, round this whole question would disappear if individuals would make clear to themselves and to others which of these three questions they were attempting to answer at any particular time. As Sir Richard Livingstone has pointed out *all* of them must be answered in any system which can be dignified by the title "education". But intelligent discussion of, still less agreement on, the practical problems involved are impossible unless they are broken down into their constituent elements. Without such an analysis of the problem individuals will quarrel interminably, not because they really differ as to what is wanted, but because one is temperamentally inclined to emphasise one factor in the totality of the educational process and the other another factor.

The first question, for instance, raises a number of issues on which opinion is by no means crystallised. The idea that there is a specific body of knowledge which those who aspire to manage others should possess is comparatively novel in itself. What is the character and context of that body of knowledge, when and how it should be acquired, whether its possession is really necessary for the effective discharge of managerial functions, are all points on which there is no general agreement. There is nothing unprecedented about this situation.

Management, the activity, is an art which has been practised for untold centuries. It is an art primarily concerned with human beings: its first syllable is Man. It is concerned with the arrangements under which human beings can co-operate most effectively with each other. Such arrangements have been one of the favourite themes of speculative philosophy since the dawn of human history. Aristotle's "Politics", for instance, is rightly regarded as one of the *great* books of our social heritage. But such books, being largely deductive in the character of their thinking, have tended to become the basis of theories, or to give them their modern title, ideologies. The practice of the art and training for the art have been predominantly empirical, dependent on the "experience" to which the individual happened to be exposed rather than on the mastery of any recognised technique. Ideas about management were regarded as the outcome of "judgment" or opinion, not as matters about which precision was possible. While there were some earlier indications of the possibility,¹² it is only within the last half century that it has been suggested that the art should be based on exact knowledge derived from inductive thinking. This development was a direct consequence of the industrial revolution. The evolution of a mechanised economy led to the association of individuals in far larger systems of co-operation for economic purposes: there was thus a demand for a greater

¹² Cf. Charles Babbage "The Economy of Manufactures", 1832. Babbage was Professor of Mathematics at Cambridge.

volume of management. The machines themselves postulated a greater refinement of co-operation: they thus demanded a higher quality of management.¹³ At the same time they brought into contact with the problems of management men trained in "disciplines" based on the physical sciences, such as engineers. The concurrence of these three influences was bound to lead, sooner or later, to an attempt to organise the existing knowledge bearing on the subject and to add to its precision by the recognised scientific intellectual methods of definition, analysis, measurement and experiment. Actually, the attempt was precipitated by the genius of an American engineer who died in 1915. His name was Frederick Winslow Taylor.

There is another art primarily concerned with man which has been practised empirically for untold centuries, the art of healing which we call medicine. In the early stages of its development it was closely associated with magic and religion. It has always been a tradition of British medicine that those who attempted to practise it should be well educated, that is that they should have a knowledge of the classics. But formal technical teaching on scientific lines is a comparatively modern development. Less than four centuries ago all that was required of a surgeon before he attempted to operate on his screaming patients—there were no anæsthetics—was that he be apprenticed for some years to a barber. No doubt, when the suggestion was first made that these "practical" surgeons should submit themselves to the study of anatomy they protested that "all this theoretical nonsense" was quite unnecessary. If we compare the position of our knowledge of management to-day, after half a century of inductive study, with the position of modern medicine after some three to four centuries of the same process, we shall have some indication of the distance still to be travelled and of the lines on which education and training are likely to develop.

In the meanwhile there is still a substantial body of opinion in this country which clings tenaciously to the view that management cannot be taught. But this view is really again a composite of a number of different opinions which bear no relation to each other.

Some, for instance, hold that there is no organised body of knowledge bearing on the subject. That is simply untrue. Between seventeen and twenty years ago two handbooks were published in the United States entitled "Management's Handbook" and the "Handbook of Business Administration". They ran to between 1,600 and 1,700 India Paper pages each. They summarised in note form some portion of the then available and organised knowledge bearing on management. The former has been brought up to date twice under the titles "Cost and Production Handbook" and "Production Handbook"; it deals almost exclusively with workshop management. The latter, which covered a much wider field—Distribution Management, Financial Management, Office Management, and so on—has unfortunately, not been revised. But hundreds of professors from scores of universities have since been most prolific in adding volumes of great weight dealing with special aspects of the subject. What people, who are managers, who say that there is no organised body of knowledge about management, really mean is that they are quite innocent

¹³ cf. "The main difficulty lay in training human beings to renounce their desultory habits of work and to identify themselves with the unvarying regularity of the complex automaton." Alexander Ure "Philosophy of Manufactures". 1835.

of any intellectual interest or theoretical training in their occupation. Since they practise that occupation with some success, at all events in their own eyes, they find it difficult to believe that there is any useful knowledge about it to be secured in any other way. They are precisely in the position of the small boy happy in the belief that his baby sister was found under a gooseberry bush.

Others emphasise that there is an element in the practice of management, judgment or tact in dealing with human beings, which is largely inherent. The development of psychology as an inductive science is far too recent to apply any adequate background of exact knowledge as to the origins of this quality or as to the means by which it may be developed in individuals. Certainly no amount of theoretical study can instil it into individuals who have not the root of the matter in them. The exercise of this quality is by far the most important feature of good management; for those in the highest positions it is the basis of the great majority of the decisions which occupy their time. Since, it is argued, so much of the essence of management rests on a quality which cannot be instilled or very much developed by formal instruction and for which there is no basis in exact knowledge, it is absurd to talk about teaching management at all. Actually those who adopt this position rest on two quite distinct and separate lines of thought. The first is that there is no exact knowledge bearing on human nature, in the sense of exact knowledge as we know it in the physical sciences. Many of the factors which enter into judgment cannot be measured. Individual human reactions cannot be forecast accurately. In particular, the interaction of individual emotions, instincts, customs, opinions and habits when people are associated in groups is a subject on which our capacity to make accurate forecasts is still very limited. And it is people working together in groups with whom the manager has primarily to deal. This premise is broadly true. But the conclusion that there is, therefore, nothing which can be done by formal instruction to improve judgment is a *non-sequitur*.

Inductive psychology is a young science. But there are already many directions in which it can be of practical assistance to the manager. He should be alert to get all the help he can, while guarding himself against the quack and the charlatan. He cannot do this unless he has sufficient acquaintance with the principles and methods of modern psychology to understand what it can do and what it can't do, and why. Lacking this feature in his knowledge he is really at the mercy of that greatest of all quacks, himself. Because he does not even know enough in this field to appreciate how little he can know as compared with the well-trained specialist. Probably the suspicion that this is the real situation explains why, in many instances, managers are unreasonably dubious and tentative in making use of such psychological knowledge as is available.

The whole argument as to whether management is or is not a science, on which much futile ink has been spilled, is in fact misleading. Management, like medicine, is an art—an art which we have been practising and must go on practising, whether it is described as a science or not. The important point is that, in our practice we should use as much exact knowledge as is available, be active in acquiring further exact knowledge and display integrity in the exercise of judgment so that it is based as far as is possible on objectively measured fact and not on guesswork, emotion or interest.

The contention that because knowledge has not the precision of mathematics it is not knowledge is nonsense. The Spanish philosopher Ortega has put the position precisely:

"Life cannot wait until the sciences may have explained the universe scientifically. We cannot put off living until we are ready. The most salient characteristic of life is its coerciveness: it is always urgent 'here and now', without any possible postponement If the physicist had to live by the ideas of his science, you may rest assured that he would not be so finicky as to wait for some other investigator to complete his research a century or so later. He would renounce the hope of a complete scientific solution, and fill in, with approximate or probable anticipations, what the rigorous corpus of physical doctrine lacks at present, and in part always will lack."¹⁴

To refuse to use exact knowledge which is available on the ground that there are other factors in the situation which are at present unmeasurable, is to attempt to behave like a physicist who is "so finicky as to wait for a century or so later".

The second line of thought is quite different. It is that so large an element in the qualities which make for a good manager are inherent, a man is born with them or without them, that it is an equal waste of time to attempt by formal instruction to "gild the lily" or "to make silk purses out of sows' ears". Unfortunately for this contention the very individuals who advance it most strongly also emphasise the great value of what they call "experience". By this term they usually mean their personal autobiographies or, more generally, prolonged contact with men and affairs leading to views not dissimilar to their own. Where different contacts with life lead to alternative views they deny fiercely the applicability of the "experience". To assert that there is a value in "experience", is, however, to admit the validity of a teaching process of some sort. And if any kind of teaching is necessary or desirable the argument that innate qualities are really the sole determinant of future capacity falls to the ground. It is innate qualities *plus* the teaching provided by experience which produce the manager. The question at issue is not, should we leave matters entirely to nature and not attempt to teach management at all. It is, which of two ways of teaching management, formal instruction or individual experience, is likely to produce the best results.

The minute the question is put in this form it answers itself. The history of every occupation which makes any real demand for skill and knowledge shows a progressive tendency to substitute a formal scheme of training, combining theoretical work and practical instruction, for the mere exposure of the student to such experience as may come his way by working alongside a skilled practitioner. Surgery and soldiering are both highly "practical" occupations. Practice must be an essential part of any scheme for developing skill. But to rely entirely on practice—an apprenticeship in which the student merely performs subordinate tasks for his master and "picks" up his "experiences" has proved an enormously wasteful and inefficient method of acquiring these arts.

It is wasteful for two reasons. If it is the only recognised system of training there is little incentive towards the accumulation and organisation of knowledge. It is

¹⁴ Jose Ortega y Gasset. "Mission of the University". London, Kegan Paul, 1946, p. 46.

often argued that there can be no formal instruction until there is something to teach. But all experience is knowledge. Until, however, the necessity for teaching is realised there is little motive for individuals to undertake the exacting task of collecting and recording experience in systematic form. History is not made in the schools. But little of it gets written till there are schools to write for. There is only folk-lore. In the scheme of apprenticeship a substantial proportion of the student's time must necessarily be expended in tagging around after his master doing things which bear no relation to the skill he aims to acquire.

It is inefficient for two reasons. All the student can learn is the "experience" with which he comes into direct contact. That is to say the skill, acquired in the same haphazard way, by the few men, possibly only the one man, whom he has a chance of watching during his apprenticeship. The limitations of any individual's powers of personal contact, whether he be student or master, are obvious. The accumulated skill of the calling is denied to him. Nor is even this limited amount of "experience" organised. It is not presented to the student in any systematic and logical order. The priority in which the various elements in the skill come under his observation is entirely accidental. It is determined not with reference to his need to learn, but to accord with the necessities of the practical work on which his master is engaged. There is no *process* of learning in any sense of the term which has any meaning. The student is merely exposed to the hazards of practice.

Let us assume, then, that there is an organised body of knowledge, susceptible to formal instruction, and necessary to the effective discharge of managerial functions. What is its nature and content?

The Committee on Education for Management analysed this content into four factors:

- (a) An adequate standard of general education.
- (b) Certain "background" subjects, knowledge of which provides a basis for the study of management in any particular field. In business these include History and Structure of Industry and Commerce, Economics, Industrial and Commercial Law and Psychology.
- (c) Certain "tool" subjects in which the manager "should have a sufficient appreciation to be able to direct skilled assistance effectively". They include, in business, Accounting, Statistical Method, Production Methods, Work Analysis and Incentives, Costing and Financial Control and Office Organisation and Method.
- (d) Finally there are the "management" subjects themselves. They include the evolution of management thought—the history of the subject, the six aspects of management already mentioned (forecasting, planning, organising, commanding, co-ordinating and controlling), and the management methods applicable to each of the major activities of business, *viz.*: Production, Distribution, Finance, Development, Purchasing, Transport and Personnel Management.¹⁵

This is admittedly a formidable list. When and how should the student acquire such knowledge? Here we immediately encounter two formidable difficulties.

¹⁵ Report on Education for Management, para. 11 adapted.

If management is to include "all those activities involving responsibility for the work of others" it is obvious that, in the words of the report, "the channels through which the individual approaches managerial responsibilities" will be "as varied as the intake into industry itself; they could not conceivably be made to correspond with any common educational background."¹⁶ How far the recruitment of managers from the ranks of technically trained personnel has already modified the pattern, how much further it will be modified by the new Education Act with its aim of securing higher education for all qualified to benefit from it, it is difficult to say. Certainly there will be a smaller number of opportunities for promotion from the ranks of the workers: probably there will be a smaller number of those in the ranks who possess great latent abilities but have lacked opportunity to develop them while young.

But, after making every allowance for these factors, a proportion of the managers of the future will, it is to be hoped, continue to be drawn from those whose education has been primarily in the school of experience. The capacity for leadership is by no means purely an intellectual matter. Individuals do not all develop at the same calendar age. Moral tales of the "industrious apprentice" variety bear very little relation to real life. The youth of real personality is as likely to be teasing the police at the head of a gang of kindred spirits as working overtime for a School Certificate. Winston Churchill's school career was scarcely an immaculate copy-book.

It is, however, vital for our society, that leadership should be given its opportunity, that young men of personality when they do settle down to the serious business of life, some of them perhaps rather later than others of their fellows, should not find themselves permanently handicapped for lack of some certificate or other. At the same time, to secure the knowledge and the educational standards required for management as it is coming to be understood, will mean a tremendous effort, once they are fully employed in earning a livelihood. It will mean not only a tremendous effort on their part, but an equal effort on the part of those responsible for teaching them.

In facing this difficulty this country has a great source of strength in the splendid tradition and high effectiveness of its technical colleges. The enthusiasm and ability in meeting the special needs of part-time students are beyond praise. But in developing their resources to meet this new demand for facilities for education in management they are labouring under a special and unnecessary handicap. There is not only a great shortage of qualified teachers of the subject in Gt. Britain. There are few facilities for training them. And the responsibility for this situation rests squarely upon our universities.

Those who teach are, like those who learn, human beings. Men and women are not going to devote themselves to an academic career in a subject, if, through studying that subject, they can obtain no recognised degree and, at the other end of their lives, there are none of the higher prizes of academic proficiency towards which they can work. And, at this moment, there is no university in Gt. Britain which offers a degree to the student of management and, with the possible exception

¹⁶ Report on Education for Management, para. 12.

of one Chair at London and the three Montague Burton Chairs of Industrial Relations which have in fact usually been given to persons drawn from other callings, there is no Professorship in the subject.

The reasons for this lack of academic facilities are somewhat complex. In the first place there are wide differences of opinion on the third question, when and how management knowledge should be acquired. Many business leaders themselves are doubtful of the economy and validity of attempting to teach the "management" subjects themselves to students who have no practical acquaintance with industry. On the other hand, some 200 universities in the U.S.A. are teaching "management" to undergraduates. And no subject which is not considered suitable for a "first" degree is calculated to arouse real interest and attention at our universities.

Far more important is the attitude of the universities themselves. Their approach to the subject appears to be influenced by a variety of factors. In the first place, management teaching does not provide so directly as education in a science or an applied science, such as chemistry or engineering, an immediate vocational element. Entrants to industry are not promoted forthwith to positions of responsibility for the work of others. A general knowledge of management techniques is a less valuable qualification *as a start* than a degree which equips the student for a subordinate research post. And while the older universities would deny strenuously any pre-occupation with such a consideration, they have to place their students.

They also appear to be influenced by the idea that management as a subject of study would fail to provide the political and spiritual elements necessary for an all-round education. This is a prejudice, based not on any real examination of the content and possibilities of the subject as an educational medium, but in part on a survival of the medieval attitude towards trade. A recent report on education for business issued by a mixed committee of academic authorities and business men appointed by the Cambridge University Appointments Board contains the sentence:

"It is, of course, not suggested that it would be desirable to supply in Cambridge anything in the nature of a commercial course."¹⁷

The implication that education for the vocation of business management is in some way less honourable than education for agriculture, forestry, engineering, teaching, playing the organ, or a score of other callings for which British universities are prepared to grant degrees to their students is curiously archaic.

In fact, modern management studies, as is clear from any sympathetic consideration of the material thrown up by the Hawthorne investigations, come closer to a realistic approach to many of the principal problems facing our society than almost any other "discipline" provided by the universities. There is no question that they cover the political and social element necessary to education in the widest sense. And, as far as the spiritual element is concerned, the list of subjects suggested by the Report on Education for Management contains a larger element of humanism than many curricula readily accepted for a degree in the Arts.¹⁸

It seems probable that sheer conservatism plays a considerable part in the distaste

¹⁷ "University Education and Business", Cambridge Univ. Press, 1945, p. 23.

¹⁸ cf. the writer's "Management as the Basis of a Liberal Education" British Management Review, vol. vi No. 3 for a fuller discussion of this point.

shown by British universities for management. In the last half century university education has drifted into a pattern which draws a sharp distinction between arts faculties and science faculties. As the task of the manager, whether foreman or managing director, is essentially a co-ordinating task—he has to integrate minds—a definite bias in either of these directions is undesirable. Since he has to deal with men and women, he must be a humanist. Since the knowledge he must use should be scientific and the minds he has to focus are many of them trained in modern technologies based on the physical sciences, he must equally have a sympathy with and an understanding of scientific thought. He need not be a scientist himself. But he must be able to appreciate what scientists are talking about.

Here the problem of education for management merges into the wider problems of university education as a whole. When the Committee on Education for Management postulated “an adequate standard of general education” they adopted the accepted meaning of that phrase as sufficient for their purpose. But there are authoritative thinkers who are not convinced that a “general education” as envisaged by our universities is an adequate preparation for the life which their students must face to-day and, even more, to-morrow.

“Man lives, perforce, *at the level of his time*, and more particularly, at *the level of the ideas of his time*. Culture is the *vital* system of ideas of a period. . . . Compared with the medieval university, the contemporary university has developed the mere seed of professional instruction into an enormous activity; it has added the function of research; and it has abandoned almost entirely the teaching or transmission of culture... . The convulsive situation in Europe at the present moment is due to the fact that the average Englishman, the average Frenchman, the average German are uncultured.¹⁹ . . . Society needs good professional men . . . But society needs before this, and more than this, to be assured that the capacity is developed for another kind of profession, the profession of governing²⁰ The man who does not possess the concept of physics (not the science of physics proper, but the vital idea of the world which it has created), and the concept afforded by history and by biology, and the scheme of speculative philosophy, is not an educated man All the other things he does in life (besides his profession), including parts of his profession itself which transcend its proper academic boundaries, will turn out unfortunately.”²¹

Is it unreasonable to hope that the growing demand for an educational background adequate to the great integrating function of management, may not recall the universities to their true purpose? It will demand of them a most painful effort of pedagogic invention, a vast energy applied to the simplifying of their teaching. But is it not clear that the existing organisation of faculties fails to meet the needs of our time? Those who aspire to positions of leadership in the modern world cannot be satisfied with an ornamental accessory labelled *arts* or the content of a single science. To live on terms with their responsibility, that is, at the height

¹⁹ Ortega y Gasset —*Op. cit.*, p. 44.

²⁰ *Ibid.*, p. 45.

²¹ *Ibid.*, p. 47.

of their times, they must not only be good professionals. They must be able to build on foundations well and truly laid in the great cultural disciplines which are the basis of all our ideas about the universe. These are physics, biology, history, sociology and philosophy. To claim that it is impossible to devise a scheme of general education which will acquaint the student with "the vital system of ideas" which they represent is a counsel of despair.

The famous Newbolt Committee on the Teaching of English in England reported "The chief criticism directed—against our present system—amounts to the charge that our education has for a long time past been too remote from life. We have come to the conclusion that this charge is supported by the evidence." Since those words were written life has moved on another twenty-seven years.

DISCUSSION

THE CHAIRMAN: I feel (to borrow from the quotation from Confucius which we have heard) that we have in fact been listening to the Master, and that we should all like to congratulate Colonel Urwick on the quality of his contribution. It is very refreshing to envisage the broad field of opportunities for education which has been opened up by this paper.

There is only one synthesis which, I think, has still to be made, and that is to reconcile the extent to which practical experience is necessary for the art of management with the extent to which this art can be imparted by the processes of education, even at the university age.

There is one matter, and I believe one alone, on which I find myself in complete agreement with Professor Laski. Both of us—I for a short period, and he for most of his life, and with much greater distinction than myself—have taught at a university. I have certainly found—and he has been kind enough to agree with me, or I with him—that the greater the experience you have of the facts of life generally, the better you can assimilate some of those very advanced forms of study which have been referred to in the striking paper which we have heard this afternoon.

It would be of interest, to me at any rate, to know Colonel Urwick's views on the extent to which a practical experience of life must be mixed with the educative process at the university level, in order that the student of the art of management can derive from education full advantage, and at the same time be seasoned with the experience on which the lecturer laid special emphasis in his earlier remarks. If he can bring those points together at any time, either in some future remarks or on the present occasion, I should be very much obliged.

I should like to emphasise the need for much greater imagination in our universities in regard to this matter. It is tempting to go into the whole question of the need for revising the approach to studies and examinations at our universities, but let us leave that for another occasion and concentrate on this one question which is before us. I congratulate Colonel Urwick on giving such a noble lead in such an excellent and high-minded way.

Major C. B. THORNE, M.C. (Director and General Secretary, Institution of Production Engineers): I should like to congratulate Colonel Urwick on his very stimulating address, which I feel is of particular value during these critical times. The Chairman raised a very important issue when he referred to the age at which education for management should take place. I feel that the fighting services have a great advantage over industry and commerce, in that they provide, by means of their Staff Colleges, facilities for training in management and leadership at a stage when their officers have had sufficient experience of life to derive the maximum benefit from such education. The point

raised by the Chairman is worthy of considerable emphasis. In the case of the average industrial or commercial undertaking no such provision is yet made for the training of their personnel in the art of management at a time when they have gained some knowledge of life, and can therefore be expected to reap the fullest advantage from this higher training. As Colonel Urwick has said, management is first and foremost a human problem. If facilities for such training could be made available to selected personnel between the ages of, say, 34 to 36, it would be a great step forward.

Mr. E. J. PRYOR (Imperial College): One dilemma is not discussed in this inspiring Paper. Science students now come to the universities from the schools with less and less foundational preparation, while the shortage of science masters in the secondary schools is increasingly acute. This is inevitable with the existing disparity between scholastic and industrial emolument. At all levels in technological training teachers with a first-class background of works experience are surely desirable. A system which pays the teacher less than the taught offers but little inducement to the men needed, when it is appreciated that the student must surrender part of his earning career in order to obtain instruction.

Mr. R. S. HILLIER: I represent a Management Association, and I have taken considerable interest in both the Report on Education for Management and the formation of the British Institute of Management. It is obvious that the object of this very inspiring paper is to inspire a knowledge of the art of management at the very highest levels. That will be very useful in large-scale industry, but I am interested in how far down the scale we are concerned with the benefits of improved management.

Colonel Urwick said that the foreman and manager are both co-ordinators, thus linking them together in management. I know, of course, that they are both concerned with management, but naturally a paper dealing with university education is concerned with the highest levels. I want to know, however, how far this drive for improved management is going to take us down to the foreman level. I should also like to know how much practical training in the craft which a man may be managing in future must go on concomitantly with other education to make him a good manager.

I have referred to large-scale industry. Undoubtedly a highly-developed training in management would call for a highly-paid post, such as could be provided only in large-scale industry; but there are many industries, some of them priority industries according to present-day judgment, in which individual units are exceedingly small, or at any rate comparatively small. They need good management just as much as, and probably more than, some of the larger ones. I feel, therefore, that some thought must be given to the improvement of management in positions which will not command a high salary, and which will not, perhaps, be worthy of those who have taken a university course of management, if such a course materialises.

Those are points of great interest to my Association, and if the lecturer could say something about them I should value it very much.

Mr. H. S. READ: The last speaker has made one or two points which are of particular interest to me. I am a Civil Servant and am concerned with the training of supervising and higher grades (which in the commercial world would be classified as managerial positions).

We are concentrating principally on education for the job, rather than on the psychological approach to managerial functions, because we are working on the long-standing principle that a person must know the job with which he is concerned before he can occupy a managerial position. It was suggested at this meeting that for management (a) a person needs experience of life and (b) there should be a university course designed to teach management. Surely a man of 20 years of age cannot have accumulated the experience of life of a man of 50. How then can a university course be designed to "put over" something which is not necessarily in the make-up of the student?

So far I have referred only to executive appointments but I should like now to

comment on training for supervising appointments. We have extensive training courses for supervision, particularly in connection with the telephone service. A great deal of work is being done in connection with the training of lower-grade supervisors who are in charge of a few telephonists. We are trying to teach these supervisors the psychological approach to their job. I should like to know whether Colonel Urwick thinks that we are biting off more than we can chew in trying to teach young women in their twenties just how to handle various types of people from the psychological point of view. In this connection we have a problem which is peculiar to the present conditions, as large numbers of men have recently been recruited as telephonists who come under the supervision of women.

Mr. G. VIVIAN DAVIES: I should like to touch on one point, namely the reward for this training in management. The leaders of industry are continually telling us that there is plenty of room at the top, and that they cannot get enough people to fill the jobs; but how are people selected for these jobs? Is it not a fact that far too much emphasis is laid on the academic qualifications of the candidate and on whether he has actually done a similar job before? If employers are selecting a man for the job of manager they want to know as a rule whether he has already been a manager for some long period, perhaps ten or fifteen years, but whether he has managed the previous concern efficiently or inefficiently does not seem to be material, and whether he knows anything about labour relations, production control and the other tools of management seems to be beside the point; the fact that he has held the job for a long time seems to be the main criterion. I think that there is a great deal to be said for encouraging the teaching of management provided the rewards are there.

Finally, I should like to ask Colonel Urwick whether he has any answer to one very serious problem which arises to-day. I understand that there is a great deal of unemployment amongst scientists and managers who are over the age of 40 to 45, and that the Ministry of Labour Technical Register has a large number of such people whom it is unable to place. The same appears to be true of the Professional Engineers' Appointments Bureau. There seems to be a great reluctance on the part of managements to engage anybody who is over the age of forty, although he may have had first-class experience not only in the particular industry or profession in question but of the world of management in general.

Commander GORDON NORTON: I suggest that both the Chairman and subsequent speakers have tended to treat experience as something rather too static, rather than as something dynamic which can be used almost immediately in the development of management. I am sure that Major Thorne will admit that the value of taking people to the Staff College from the ranks from which they are chosen and at the age at which they are chosen is that they must have had practical opportunities of dealing with other men, and it is in dealing with other men that they must have found the necessity for being in sympathy with them, a point which the lecturer brought out. Experience, therefore, is not what may be locked up in a man of over 40 years of age who has had a great deal of static experience; he must be able to develop what he has found and bring it out in such a way as to encourage others around him themselves to do rather better.

Miss A. I. G. HEWITT: There is one small point which has puzzled me ever since I attended the Oxford Conference on Training for Management last July. There is no doubt that this training for management will not attain its full status until it has the blessing of the older universities, yet when we sat discussing this subject in Oxford we were doing so in rooms which were completely airless and without proper light, heat and ventilation, with equipment which would not be accepted by an elementary school. I wondered to myself at the time how in such circumstances we could train young managers to take an up-to-date point of view. The two attitudes of mind seemed almost irreconcilable.

Lieut.-Colonel URWICK: I am afraid that I cannot hope to cover so big a field as that traversed by the discussion in the short time at my disposal. The Chairman raised a question which underlay a good many of the observations of other speakers: to what extent is practical experience necessary, and how far can you teach the art of managing in educational institutions? I do not think that we shall find that out adequately without a good deal more experiment, but I think that we ought all to recognise that we cannot expect the manager to spring armed *cap-à-pie* out of any kind of examination school. Education, even at university level, does not produce a finished article. It is that sort of attitude towards it which leads to so much trouble; Humpty-Dumpty falls off the educational wall with a qualification, and "all the king's horses and all the king's men" can never pick him up again; he thinks that he has a qualification that his education is finished and his mind goes dead.

The purpose of university education is to make a man competent to learn *both* from experience and from books; and if our university education does not turn a youngster out into industry who is prepared to say "I am only at the beginning now; I am going to begin to get practical experience, and for the next six or eight years I am going to take care to fill in all the gaps", then the university education is no good and is not doing its job. The process of making a leader of the highest quality in any technical occupation goes on at least until he is 38 or 40, and if he has carried on until then he will go on learning for the rest of his life.

On the practical point, I believe that you should not try to teach a student the actual management subjects at the university; you should try to lay a foundation of the disciplines which may bear on his task—I have outlined a few of them—so that he will acquire the habit of going to books and of systematic thinking. You should also enable him to clear out of the way the "background" and some of the "tool" subjects. The rest of his practical learning he should do by part-time study after he has gone into business life. That is not such a frightful hardship. I came back from the first world war and found myself in industry without a shadow of technical qualifications. There was no technical qualification in management in those days. I read from 8 o'clock until midnight for five nights a week for two years. It did not kill me, and I do not see why it should kill other people.

That really answers Major Thorne. Obviously men must somehow or other acquire that higher training at the age of 32 to 36 which the Services give at their staff colleges. Otherwise they will never bridge the enormous intellectual gap between commanding a unit and commanding a formation, a group of units, which is a very different sort of command. To bridge that gap they have to be given a chance to re-make their minds and their thinking between the ages of 28 and 36. I think that for the new Administrative Staff College which is proposed the time allowed is too short; if it could be extended, that would be the ideal.

I agree with the university teacher who pointed out that we are not getting teachers in the way we should. Our Chairman knows the difficulties of lifting the teaching profession from the ranks of a sweated industry. I can only say that that is a matter in which all of us as citizens bear a share of responsibility. Unless and until we lift teaching out of the ranks of the sweated industries, and insist that it should be so lifted, we shall get what we pay for.

I am not going to worry if, apparently, not sufficient direct attention is being paid at this moment to the lower levels of supervision, because it is no use doing so *until* we have put the higher levels of management on a better basis. The men to train the non-commissioned officer are not the lecturers at the Staff College but the battalion commander, the adjutant and the regimental sergeant-major of his battalion. Until we have taught those men something about management, any effort we put into training the non-commissioned officers will be wasted. On the other hand, there is no need for alarm. Only ten days ago I addressed a group of supervisors 350 strong. They are alive to the importance of training; the best of them are more alive to it than many managers.

The same holds true of the small business. It is more difficult to organise training in a small business. But if education for management "gets cracking", as I think it will, among the big fellows who set the fashion, the intelligent young manager of a small business will see that he gets it, and his supervisors will try to get it. The supervisors are coming along already, but there are not sufficient facilities for them. We all know that, and we are trying to help to provide them.

There is no chance of any serious-minded man who cares about management forgetting that the key-man in his works is the foreman and the working charge-hand, the men in charge of the primary working groups. They *are* the company to the rank and file of the workers, and no amount of skill and brilliance on the part of the managing director is of the least value until they have filtered down to the man or woman in the line. They are the people who do the job, not the managing directors.

Mr. Read, from the Civil Service, asked whether they were wrong in trying to teach young supervisors psychology; he said "Are we biting off more than we can chew?" The answer is that it all depends on the sort of psychology which you are teaching the young supervisors. You are right in teaching them some psychology, but you will be wrong if you hand them some major work to study. Moreover, it is no good teaching young supervisors psychology unless the higher ranks who are going to manage them are also taught it at the same time. The very senior Staff Officer, well bedded down in the traditions of the Service—"the heart and stomach of the Service", as he has been described, "and the key to its tegasaurian inflexibility"—is the problem; he is the man whom we have to teach.

I agree with the statement that too much emphasis is laid on academic qualifications and on absolutely parallel experience, but that is just evidence of lack of management knowledge in another sphere, knowledge of how to go about this difficult job of selecting human beings for first appointment or promotion. People who do not know much about it are lazy and will take any easy way out. I have warned you against that. I have heard of several employers recently who will not take a candidate for their clerical staff without a School Certificate. It is appalling to find people taking the easy path of accepting an academic label like that instead of really choosing people. There is a great deal too much of that sort of thing.

I am sorry that Miss Hewitt suffered from the austerity which is part of our university education at the present juncture. There again it is a matter of management knowledge. Somebody once said to the late Henry Ford—who, after all, was a bit of a genius—"Mr. Ford, if you bought a factory which had belonged to another company, what is the first thing that you would do?" Henry Ford looked at him and said "Clean it". Cleanliness and appearance have their values. You must not think that the Army is quite mad about polishing buttons. All that sort of thing has a part in promoting collective pride. One of our tragedies at present is that owing to restrictions which, perhaps, we cannot avoid, cleanliness and a smart appearance which are symbols of collective pride can be achieved only by breaking the law.

THE CHAIRMAN: May I thank Colonel Urwick most warmly on your behalf and my own for his very brilliant summing up, following on his excellent Paper. It has been a great pleasure to all of us to be here this afternoon. We hope to hear him again in another incarnation or on another occasion and enjoy and profit by his address as we have this afternoon. We hope that he will continue his crusade with the same fire that he has shown to-day.

The vote of thanks was carried with acclamation.

Sir HARRY LINDSAY: Before we go, I should like to propose a very hearty vote of thanks to our Chairman. As you know, Mr. Butler has laid the foundations of our national educational policy. Governments may come and Governments may go, but the foundations of that policy have been well and truly laid. We are grateful to Mr. Butler for that, and also for presiding so efficiently and charmingly this afternoon.

The vote of thanks was carried with acclamation and the meeting then terminated.

THE TRADE AND TECHNICAL PRESS

By ROLAND E. DANGERFIELD, *Managing Director, Temple Press, Ltd.*

Fourteenth Ordinary Meeting, Wednesday, March 10th, 1948

Sir ERNEST BENN, BART., C.B.E., *in the Chair*

THE CHAIRMAN: It gives me special pleasure to preside this afternoon at the very interesting lecture to which you are to be treated by my friend, Mr. Dangerfield. I feel that he and some of those present to-day will allow me to say, that I occupy this position almost of right, to preside over a meeting to hear a paper on trade papers. I cannot recall a living man who has a better right than the antiquarian who addresses you at the moment!

Mr. Dangerfield, whom I have met for the first time to-day, is a son of a very old friend of mine who was associated with me in the "Hardware Trade Journal" nearly fifty years ago, when he printed it and made the money while I did the work and produced the journal! He is a distinguished trade journalist himself, having been the managing director of the Temple Press since 1933, and very nearly thirty-three years in the business interrupted only by a distinguished flying career in the first world war. I am sure you would like me to congratulate him on his very recent appointment as Chairman of the Temple Press. He has also been the Chairman of the Council of the Trade and Technical Press for ten years past.

It is a subject which is worthy of study, not only by us of the technical press, but by the general public, because we are, in one way at least, a model for the whole of the press. The trade press is the responsible end of the newspaper field. I make that claim advisedly and justify it in this simple way. If you widen it and say the "class press", which is the better term, those engaged upon it have the responsibility of writing for readers who know as much about the subject as the writers, and that is a responsibility which sits very very lightly upon the shoulders of some of those who call themselves journalists in these days when the chase is after what is called a story. It is a very severe test and puts a limitation and a quality on to trade paper work which is difficult to find in every branch of the press. I like to think of these trade, technical and class papers as each of them possessing a soul, a character, a quality and a leadership of its own, and that is emphasised if you could, as I can, go back for sixty years or more and think of the giants in the business who were in their time the real fathers, guides and counsellors of the industries about which they wrote and over which they presided.

I mentioned Mr. Dangerfield's father. Some of you may remember my own father and other names like Morgan, J. T. Day of the "Shoe and Leather Record", Bridge-water of the "Drapers Record", Stewart of the "Gas World", Rider, Rivington, Reed and others. They were men of a quality which, without disrespect, it is hard to find to-day, if only for the adequate reason of a couple of wars and the wiping out of a generation. The field is thus open for men like our lecturer to-day to rise again to the great heights which were achieved in the past.

Well, you did not come here to listen to me, but before I ask Mr. Dangerfield to address you, I should just like to remind you of the collection of trade and technical papers which is to be seen downstairs. To me it is full of interest as a collection of little miniatures of the trade press as we used to know it, and wonderful proof of what can be done to overcome our present shortage of materials.

The following paper was then read.

Used in its broadest sense, the term "Trade and Technical Press" embraces over 900 British periodicals, of which approximately 300 may be regarded as representative. These figures compare with about 150 morning, evening and Sunday newspapers published in the United Kingdom.

To deal adequately this afternoon with so considerable a section of the Press of this country would obviously be impossible, but perhaps I shall be able to give you some idea of its multiplicity of interests and of its far-reaching influence.

For the sake of clarity, some kind of arbitrary division of the various types and classes of journal is essential, and although inevitably there must be overlapping, and cases where some fall into more than one category, I propose for this occasion to classify them under the following six headings:

- (1) Technical journals.
- (2) Trade and industrial journals.
- (3) Specialised journals.
- (4) Export journals.
- (5) Professional journals.
- (6) Miscellaneous journals.

I think it will help in considering these various classes if certain journals be named as examples. These I have selected as typical of their class, with a bias towards reverence for old age, in order to avoid, so far as possible, invidious comparison.

First, there are the *Technical Journals*. Here are to be found journals dealing with engineering in all its branches; with mining; with forms of transport, such as shipbuilding and railways; also the electrical journals and the more modern specialised journals, such as those dealing with metallurgy and plastics.

Their main object is to disseminate all over the world accurate information of progress and improvement in design, materials, equipment and production methods. They concentrate largely on descriptive articles telling readers, for instance, what machines are becoming available, and what they can do, so that a prospective purchaser may judge for himself whether they are suitable for a job he has in mind, or sufficiently superior to existing equipment to justify a change. These are matters of obvious importance to the efficiency of industry.

The established technical journals have developed stage by stage with the progress of industries from their earliest days; not merely recording progress, but indicating the way ahead.

Leaders of this class include the two old-established journals, "The Engineer" (1856) and "Engineering", which followed ten years later. Other venerable examples are, "The Railway Gazette", "The Electrical Review", "The Electrical Times", "The Colliery Guardian", "Iron and Coal Trades Review", "The Foundry Trades Journal", and of later vintage "Machinery", which concentrates for the most part on the machine tool industry. But pride of place on the score of age must go to "The Mining Journal", which, founded by Henry English in 1835, is believed to be the oldest journal of its kind in the world.

As a typical illustration of the scope and function of the Technical Press, I think it worth recording one achievement of many during the long career of this journal. Inspired by the great success of the Paris Exhibition of 1889, the then editor (and over this great span of years it has had only seven editors) successfully organised the International Exhibition of Mining and Metallurgy, held at the Crystal Palace in 1890. And, as a direct result of this success, The Institution of Mining and

Metallurgical Engineers (now known as The Institution of Mining and Metallurgy), was formed in 1892.

To-day, it is a commonplace occurrence for the trade or technical journal to initiate and organise such exhibitions, and such activity is accepted as just another of its multifarious duties.

One learns that the first editor of "The Mining Journal" succeeded in arousing the interest of the Prince Consort (who meant so much to the Royal Society of Arts), and subsequently, public opinion as well, to the need for safety legislation in mining.

In those days, if an editor wanted information he had to go and gather it by stage coach, and it is recorded that the editor of "The Mining Journal" on one occasion



The collection of current Trade and Technical Journals which was on view in the Society's Library on Wednesday, March 10th

found himself with a drunken driver, who upset the coach; resulting in three broken editorial ribs, and a long delay in hospital on the road.

"The Railway Engineer" (1880) was taken over by "The Railway Gazette" in 1919, and the former ceased separate publication in 1935.

"The Electrical Review" was started under the title of "The Telegraphic Journal" in 1872; certainly long before any electrical industry had developed beyond the production of measuring instruments, cables and telegraph apparatus. The telephone and electric light had not yet emerged from the laboratory stage, so that it can well be said that "The Electrical Review" was born in advance of an electrical industry.

The electrical industry owes many debts to the Royal Society of Arts, including the loan of its rooms for meetings of the Institution of Electrical Engineers for a period from February, 1895, when other rooms were unsuitable as they were not

supplied with electricity. The Institution of Electrical Engineers was in 1882 known as "The Society of Telegraph Engineers and Electricians" and the journal of the Society of Arts of that date once referred to it as "The Society of Telegraph Eccentricities and Electricians", but a full apology was made for this inexplicable mistake!

Most journals of established reputation, such as those already mentioned, are published weekly, but of recent years, with the increasing tendency towards specialization, the high quality well-produced monthly periodical has arrived.

Examples of this type are those dealing with automobile and aeronautical production; motor ships, radio, electronics, diesel engines and others. Produced under more leisurely conditions and serving a distinct field of their own, they are mostly fine examples of the printers' and blockmakers' art, and with the introduction of colour are at least equal in presentation to any similar journal published abroad. But, of course, they have no claim to be newspapers, and can therefore never replace the technical weekly periodicals—yet they are nevertheless an important and valued section of the Technical Press.

Next are the *Trade and Industrial Journals*. In a pamphlet on the Trade and Technical Press issued by my Council in 1945, a trade journal is described as a paper directed to the distributor, providing the information that he requires as to the goods which he proposes wholesaling or retailing to his customers. It tells him how he can obtain these goods, their selling points, and the best methods of presenting their attractions to the public. In specific cases, it supplies the service information necessary to ensure that the goods give satisfaction in use to the ultimate buyer.

It has been said that a trade journal has become as essential to a trader as any part of his equipment, such as a cash register, and without it few retail shops (especially the tens of thousands of smaller ones) would be able to carry on. This claim may well be justified, particularly under present conditions, because only through his journal is he able to understand the innumerable Government Orders and Regulations. Part of the function of the trade paper is to translate such Orders into ordinary language—no mean feat. I might perhaps quote a recent example to denote enterprise on the part of the trade press in dealing with new legislation. On August 6, 1947, the highly controversial Transport Bill received the Royal Assent after an all-night sitting on Bank Holiday by the House of Commons.

On August 15th, a trade paper produced a complete summary of the Act specially written for the layman by a legally qualified author. The summary comprised about 14,000 words, and a week after its publication in the journal, was on sale as a separate booklet. It was not until some weeks later that H.M. Stationery Office printed the Act.

Probably, it is no exaggeration to say that without this intermediary assistance between the Government and the ordinary trader, the practical working of controls and so on might well have broken down. At any rate, there is plenty of evidence to show that individual Ministries continue to rely more than ever upon the appropriate trade newspaper for this purpose. During the recent war, for instance, one journal (which is both technical and trade) kept a careful record of the number of major requests to the editor for information from Government departments—there were no fewer than 280 of them and all were met. They included the provision of important plans which could not be obtained anywhere else in the country.

In the main trade journals are non-political, but frequently they play a leading part in organising protests against oppressive legislation regarded as harmful to the industry or trade concerned.

Many of these journals are newspapers in the strict sense of the word. Late sheets are held back until the afternoon of the day before publication, in order to include market prices and other late news, which can be found nowhere else.

One notable difference between this type of journal and any other is that its circulation is in most cases restricted to the trade it serves. That is to say, practically all copies are distributed by direct subscription through the post, and are not on public sale through the usual news trade channels. Even under normal conditions, therefore, when most periodicals are offered "on sale or return", there is no waste circulation of the trade paper.

One of the principal, yet least known functions of the trade and industrial publication, is the direct service rendered to the reader by post or telephone. Although this practice is not confined to the trade journal (being common to all specialised periodicals) for obvious reasons it plays a greater part in a trade paper organisation than in any other type. Such service is of outstanding importance, but because little evidence of it appears in the pages of the journal, one feels that it has never been fully recognised.

To receive anything from 500 to 700 letters a week from readers is by no means uncommon. Information and advice is sought upon every conceivable aspect of the trade. In addition, many hundreds more requests arrive by telephone and telegram. So much has this practice become part of the daily life in the editorial office that many of the leading journals retain a specially trained staff, whose activities are confined solely to dealing with such enquiries. Infinite trouble and research have to be undertaken in order to give readers accurate and comprehensive replies. From no other source can similar facilities be obtained; yet it is accepted almost as a right by readers and, I may add, freely given by editors.

Industry is indeed fortunate to be able to rely upon its trade press for this essential service, and bearing in mind that every trade has one or more journals, it will be realised that the collective value in this respect alone is so great that it cannot be accurately assessed.

Besides covering the usual trade news, the trade paper publishes company reports, legal cases and meetings of trade associations. Also, it deals extensively with domestic, social and personal events within its own sphere.

Of the hundreds of journals falling within this class, I can name but a few: "The Builder" (1842) founded by Joseph Aloysius Hansom, an architect of note, "The Ironmonger" (1859), "The Chemist and Druggist" (1859), "The Grocer" (1861), "The Grocers' Gazette" (1881), "The Drapers' Record", "The Drapers' Organiser", "The Cabinet Maker", "The Hardware Trade Journal", "Timber Trades Journal" and "The Leather Trades Review". All are well past their Diamond Jubilees, and are great names much respected in their own worlds.

As in the case of the technical journals, many new monthly trade periodicals of high quality have sprung up during this century, and so each industry is nowadays represented by a number of journals varying from two to more than a dozen. In the case of road transport, I believe that there are altogether over thirty periodicals

falling within the definition of trade and technical, but the reason for this is the necessity to deal separately with each of the several distinct branches of road transport.

There can be no doubt that industry as a whole is well covered by its own press, and its journals may justly claim to be also the historians of industry. For in their pages will be found faithfully recorded the only complete histories of the industries which they represent and, in many cases, helped to pioneer from the earliest days.

Then there are the *Specialised Journals*. Included under this heading is a large group of important journals which is neither wholly trade nor technical, but a mixture of both. For example, it would be inaccurate to describe the two leading agricultural weekly papers—"The Farmer and Stock-Breeder" (1843) and "Farmers' Weekly" as trade or technical, for the scope of these journals is much wider than the description implies.

With the farming papers may be included "Horse and Hound", which deals with the breeding of bloodstock, and "The Smallholder"—the latter being the journal for those worthy citizens who produce food in their own gardens or allotments.

Agriculture is the greatest British industry, and I feel, therefore, that we should dwell upon this subject for a moment.

As "The Farmer and Stock-Breeder" (known originally as "The Agricultural Gazette"—first editor, John Chalmers Morton) has borne the brunt of the struggle for over 100 years, I think I cannot do better than read a brief extract from the Centenary Issue of this famous journal:

"Through a century of ever-changing methods British farming has progressed to a state of production exceeding that of any other country in the world. 'The Farmer and Stock-Breeder' prides itself in having taken a not inconsiderable part in bringing this about. From its inception it has sought to give early intimation of innovations; it has told of fruitful research, of profitable—and even unprofitable—ventures; it has passed on to its readers what fellow farmers in remote or near regions have thought and done in the furtherance of practice; it has given counsel on every phase of farming in every part of the Kingdom, and for many years its advice has been sought by politicians of all parties.

"To-day, farming finds still more needful the impartial collaboration of an independent journal. Departmental interest in the industry has been accompanied or followed by departmental fostering of a kind looking sometimes very like intrusion.

"An independent medium of public opinion is the only effective buffer between excessive supervision by a fussy department and excessive laxity by a reluctant farmer. Produced by men who themselves are actively engaged in farming, 'The Farmer and Stock-Breeder' is in the best possible position to give support or criticism to Government measures.

"Our founders' faith we have preserved untarnished; with our readers' help we mean to keep it so. We regard our paper as a heritage and to that end are planning that its traditions shall be carried on for a further century".

Other prominent examples of specialised periodicals are the motoring, aeronautical and motor cycling journals, and certain papers dealing with hobbies and

amateur pastimes, such as gardening, wireless, yachting, cycling, photography, poultry keeping, dog breeding and model engineering.

Those journals representing the motor and aviation interests, such as "The Autocar" (1895) and "The Motor", "The Aeroplane" and "Flight", serve at least three sections of the community all over the world: those in industry, the technically minded (the technical standard is at least as high as that of the purely technical journals), and the well-informed enthusiast among the public, whilst in the case of the aviation journals regular attention is also paid to H.M. Fighting Forces. This blend of interests has gradually evolved over the years, and seems to function satisfactorily for all concerned.

One notable difference between the specialised and the trade and technical weekly periodical is that, for the reasons I have just mentioned, the sales of the former are much the greater. The farming weeklies, for instance, have a circulation of well over the 100,000 mark, and in common with all trade and technical journals are certainly read by several times that number, as copies are passed from hand to hand.

The sales of the more technical journals in this group also run into substantial figures, as they are on public sale through the normal channels, both at home and overseas.

Now let us examine the *Export Journals*: those which are produced entirely for circulation overseas. Never before has this class of journal been officially recognised as of such importance as it is to-day. The Board of Trade accepts this fact by meeting, without restriction, all reasonable demands for paper; whereas trade and technical journals distributed at home are still rationed to approximately one-third of their pre-war paper consumption, although an extra allowance of paper is granted for the circulation of copies abroad. As these export journals are the independent ambassadors for British commerce all over the world this is, of course, as it should be, for a healthy-looking journal signifies to the overseas buyer a prosperous industry, and is often the only tangible yard-stick of such prosperity. Practically every copy is sent abroad, and some are printed in the language of the country upon which a journal is concentrating.

Technical export journals are concerned with the machinery and equipment available for the manufacturer or producer abroad, whilst trade export journals provide the overseas distributor with the essential information about the consumer goods which Britain has to offer.

Some export journals are distributed free, but this does not mean that they are scattered about in a haphazard or extravagant manner. On the contrary, highly selective mailing lists, often put together in collaboration with manufacturers and traders, are steadily accumulated.

The same method of distribution is employed to a greater or lesser degree by home-circulating trade and technical journals. In the course of years, lists containing as many as 100,000 names and addresses are gradually compiled. These are then broken down into appropriate sub-divisions. Much time and money are expended in the preparation of these lists and, moreover, they have to be constantly revised and amended.

An exceptionally valuable feature to be found in most export journals is a service

bureau whereby potential purchasers abroad and those seeking agencies are put in touch with suitable interests in this country.

Notable examples of this group are: "The British Trade Journal and Export World" (1863), "British Engineering Export Journal" and "The Overseas Engineer", all of which are general in scope, whilst there are others such as the two Export Trader publications, which specialise, the one upon cars and trucks and buses, and the other upon cycles and motor cycles.

But perhaps the most strikingly presented are those covering the textile, clothing and fashion trades, some of the leading examples being: "British Textiles", "Fashions and Fabrics Overseas", "Vogue Book of British Exports", "Style for Men Overseas" and "Men's Clothes". As might be expected, the subjects especially lend themselves to fine-quality printing, particularly colour work, and publishers avail themselves to the full of the best that the British printer can offer.

Trade and technical export journals, taken as a whole, undoubtedly exercise a powerful influence upon British trade abroad. Of no less influence is the overseas readership of the home-circulating journals. Indeed, in the view of some people, it is even more valuable, because the copies are bought (in a number of cases this overseas paid-for circulation is as high as 50 per cent. of the total) and the importance of this cannot be over-emphasised, especially as at the present time no German technical journals are published.

Let us now turn to the fifth classification, that of the *Professional Journals*. My reason for including this group under the general heading of trade and technical is that they are more closely associated with them than with any other section of the press. They are, in fact, so regarded by the Board of Trade in the matter of paper supplies.

Any explanation as to the function of this class is superfluous, because the titles so clearly speak for themselves: medicine, law, accountancy, education, insurance, banking, art, music, science, architecture, surveying, theatre and horticulture all have their own journals, bearing honourable names of world-wide repute.

No better illustrations of the professional journal can be given than the two medical weeklies, "The Lancet" and "The British Medical Journal". "The Lancet", the first of the weekly journals, was founded so long ago as 1823 by Dr. Thomas Wakley. Dr. Wakley was editor for 39 years. He was also a coroner, a Member of Parliament, and a general practitioner—his first consulting rooms and editorial office being in Norfolk Street, Strand.

Although he was only 28, Wakley set out to correct the more glaring medical abuses, even though this meant a series of clashes with the diehards of his time. He also aimed at publishing the best of the medical lectures given in London, recording important cases from all parts of the world and, as he put it, providing a "Complete chronicle of current literature". The six editors who have succeeded Dr. Wakley have largely retained his original aims.

The most outstanding feature common to this group is perhaps the quality of the editorial articles, because there is no better example of experts writing for experts, and, as with the purely trade journal, presentation as such is not of primary importance.

There remains a residue of *Miscellaneous Journals* which, although they do not lie strictly within my terms of reference, would render this paper incomplete were they omitted.

First, I place the journals published by learned societies, such as the "Journal of the Royal Society of Arts", which serve a real and obvious purpose, and upon which there is no need to make further comment here.

Second, and in a different category, there is an assortment of publications emanating from such sources as His Majesty's Stationery Office, trade associations and individual organisations which issue what are known as House Organs. Whilst some of these no doubt serve a useful purpose, the majority are not *bona fide* periodicals in the sense that they are produced on an ordinary competitive commercial basis. Their survival does not depend upon whether they make a profit or a loss. On the other hand, many of this type are in a peculiarly strong position to bring pressure to bear upon advertisers, which is regarded by the professional publisher as being in the nature of unfair competition.

Be that as it may, in the long run this kind of publication is of doubtful value because it cannot be expected to retain the faith of the reader in the same way as can an independently published journal.

So much for what might be termed the explanatory part of this discourse. Let me now try to survey the picture as a whole.

The fundamental difference between the trade and technical press and the remainder is that the former is more closely identified with industry and the professions than with the ordinary newspaper world. The whole conception and purpose is quite different from that of the newspapers. All such journals, in fact, form an integral part of those industries and professions which they represent.

Proprietors, executives and editors alike devote their lives to working, sometimes with almost fanatical fervour, for the cause which they have at heart, not only through their journals, but also in many other helpful ways.

Here I confess that I have found the preparation of this part of my Paper no easy task; for, strangely enough, we of the trade and technical press, who spend our lives portraying the performances of others have always been singularly reticent upon the subject of our own achievements.

A good example of this is shown in the following quotation from the leading article of a well-known trade journal when celebrating its 60th birthday: "It would not be proper or seemly to refer to its record or service—be it great or small—to the trade it represents. That is best estimated by those whom it seeks to serve."

Such modesty may be a welcome contrast to the blatancies of the head-line and the loud-speaker; yet one is tempted to comment that although it may be magnificent, it is not business. In fact, it is just another unfortunate example of British understatement which is so often misunderstood abroad.

The highest standard of integrity is a *sine qua non*, and the respect in which an established trade and technical journal is held can be acquired only as a result of having given many unbroken years of faithful and efficient service, and the goodwill thus established is a thing of incalculable value. Those responsible for the conduct

of specialised trade and technical journals are in the position of trustees acting not only in the interests of readers and advertisers, but also for future generations of managements and editors.

Close and intimate as the partnership between journal and industry may be, complete editorial freedom remains. In these more enlightened days, attempts, as in earlier days, by advertisers to bring pressure to bear upon the editorial department are rare. Advertisers appreciate, as publishers have long realised (in the past this freedom has had to be fought for) that independence lies strength. A journal which is under the thumb of, or allows its policy to be dictated by outside interests, however well meaning, can never gain the enduring confidence of its readers. Without such confidence, it may as well cease to publish. For this reason an official or sponsored journal, such as I have already referred to, can never successfully compete on equal terms with the independent.

It will be seen how delicate is the balance of power between the parties concerned. On the one hand editorial independence is essential. On the other hand, if it be abused by irresponsible conduct or wrong handling due to ignorance or aloofness, or insufficient attention to responsibilities, the repercussions may well be serious. From time to time there are occasions when an editor feels it to be his duty in the interests of industry to criticise severely a certain product. By so doing, his action, instead of having the beneficial result he had intended, may have precisely the reverse effect. Such is the influence of his journal that the consequences of his criticism may be out of all proportion to what is necessary to meet the case.

Not infrequently then, an editor may decide that the wiser course is to communicate his views direct to the manufacturer in question, who usually accepts the considered opinion of an editor. Thus, although in so acting an editor may lose a good story, the desired result is achieved to the benefit of industry. Of such happenings, however, the outside world knows nothing.

At this point I think it would not be inappropriate to make a special reference to editors. After a good many years of daily contact with them, I would like to express my unqualified respect for this unique band of individualists. The qualifications required to fill this responsible post in the trade and technical field are many and varied.

First, they must be men of the highest character, to the extent that members of industry have implicit faith in their judgment and trust in their personal integrity. A technical editor is often consulted upon the most confidential matters, such as new designs in the earliest stages of development, or even in the embryo stage before the blue-print stage is reached. Such confidence must never be misplaced, and not only is absolute discretion required, but self-restraint to a high degree, especially when he knows his competitor is under no similar bond of confidence.

Second, he must be a complete authority on his subject. To achieve this mastery he will require a sound knowledge of its history in the past, and, at the same time, be able to forecast with reasonable accuracy and assurance the trend of developments in the future. At times he must be prepared to take a lead even if at the risk of incurring temporary displeasure.

Third, although the chances are that he is a technical specialist rather than a

trained journalist, nevertheless he must be capable of writing good English with fluency and facility, avoiding all journalese.

Fourth, he must possess a creative mind, and be a combination of idealist and practical business man.

Fifth, he must be a successful diplomat, for he has to keep the peace, not only with his industry, but with those with whom he works, such as directors, advertising and circulation managers, and the printer.

Sixth, he must be a good social mixer, and amongst other attainments, be able to make reasonably good speeches at the innumerable trade functions he attends, or over which he may be presiding.

Seventh, a working knowledge of the law is essential—especially that of libel.

Eighth, he must be able to find, train and control a staff of specialists for which there is no ready-made talent available, and this responsibility is one of his constant problems.

Above all, in spite of set-backs and frustrations, he must keep himself at a high pitch of enthusiasm. The constant and unrelenting stress and strain of producing a trade and technical journal year in and year out (in which every slip is at once spotted by a no less enthusiastic and knowledgeable readership), must never be allowed to damp the editorial ardour.

These then are some of the necessary qualifications of an editor. And upon the right choice for the editorial chair depends success or failure for a journal, no matter how efficient be all other sections of the publisher's business.

From this, the conclusion must not be drawn that the advertising side is of little importance by comparison with the editorial department. This is far from being the case, for in most journals the advertising is of not much less interest than the text pages, particularly when appropriate "copy" is specially prepared. In fact, certain journals are bought for the express purpose of studying the advertisement pages. The mind of a reader of a specialised paper is already attuned to the subject covered by that paper. He expects to find advertisements of certain specified products. Thus, to use modern jargon, there is a minimum of "sales resistance". Probably no other section of the press exercises a keener censorship upon its advertisements, particularly is the status of new advertisers given careful scrutiny, and in accordance with the now generally accepted practice of the press as a whole, grossly exaggerated claims in the "copy", or direct attacks on competitive advertisers are not permitted.

Many journals carry scores of columns of classified advertisements. Realising their importance to the building up of circulations, attempts are made by newcomers from time to time to induce advertisers to participate by the offer of exceptionally attractive terms. Usually these efforts fail because the cumulative results of years are necessary to bring about the desired recognition by advertisers of the value of these sections. Once that has been achieved, such sections are looked upon as established markets in themselves.

A substantial proportion of all advertising is allocated to building up goodwill, and the consistent use of the trade and technical press over a period of years is recognised as one of, if not the most economical method of acquiring this valuable asset. On the other hand, if the products advertised be suitable for direct sales

through the pages of an established journal, the results are frequently startling, and even occasionally embarrassing in their effect.

Let me quote two cases as illustrations:

(1) Before 1939 a single advertiser spent no less a sum than £10,000 a year in one semi-technical paper. A retailer selling direct to the public, he made no secret of the fact that he had succeeded in building up a prosperous business as a result of his advertising in that one journal.

(2) A shipbuilding firm in this country received through the post an order from a new customer in South America for the construction of a large cargo liner. The only stipulation accompanying the order was that the ship must be built to the identical specifications as set out in this shipbuilder's advertisement appearing in the "—————", of such and such a date.

Incidentally, some years ago another British shipbuilder of somewhat old-fashioned ideas wrote to this same journal saying, "As you know, we do not believe in advertising, but we have such a high opinion of '—————' that we are enclosing a cheque as our contribution towards its cost of production". The cheque, I understand, was politely returned.

One further point on advertising should be mentioned; although this applies equally to editorial reference. The "pulling power" of the technical press is not lost when an issue becomes out of date. Its life may continue indefinitely. Special numbers in particular are frequently kept for reference purposes, a fact which is not overlooked by regular advertisers.

An announcement may, and frequently does, continue to bring results and enquiries for months after publication, especially in the case of those journals with substantial circulations overseas. Only recently the editorial office of a well-known weekly journal received, without previous warning, a telephone call from Australia. The enquirer had just noticed an article in an issue which had been published several months previously. He wished to place an order for an expensive piece of machinery described in this article; but before doing so, he wanted to discuss a number of points with the editor. The order was subsequently placed.

Unlike the ordinary newspaper, the attainment of high circulation figures as such is not a primary objective. Taking the whole range of the trade and technical press, circulations vary from a few hundreds in the case of highly specialised technical publications up to, say, 150,000 with those covering a wide field such as agriculture.

Nor does it follow that one class is of any greater standing or value than another. It simply means that the readership is selective, and to attain this, there is no need to indulge in expensive and wasteful methods; a much more careful and scientific system has to be adopted.

The number of copies circulated of a journal bears little relationship to the actual number of readers of that journal. As is well known, the usual practice is for a firm, an institute or club, to order a copy, which is then passed on from hand to hand, so that as many as a dozen or more individuals may read this single copy. Even those people who do not themselves read a specialised journal cannot escape its influence, for sooner or later, before effecting a purchase or sale, either of a personal

or business nature, they will seek the advice of the well-informed or the expert whose opinions are based upon what he himself has read in a specialised publication.

An additional point to bear in mind is that the press all over the world quotes extensively from the British trade and technical press. Articles are often reprinted in full, and such a practice, which is widespread, is obviously of great benefit to British industry.

The total number of readers of the trade and technical press at home and abroad runs into millions, the great majority of whom rely, in no small measure, for their livelihood upon the information obtained from these journals.

It is not surprising to find an exceptionally keen sense of loyalty on the part of the reader. As an expert or enthusiast himself, he is, as I have already indicated, often critical in the extreme. The industrial reader even becomes quite possessive, and in a friendly way speaks of "our" journal. Just as he, quite properly, reserves the right to keep his own press on its toes, so equally will he rush to its defence should some outside interests, in their ignorance, attempt to assume the role of critics.

To summarise, I would say that the fundamental characteristics of the trade and technical press will be found in a few words: INTEGRITY—AUTHORITY—ACCURACY—STABILITY—INDEPENDENCE AND CONTINUITY OF PURPOSE.

Through the years the good work is carried on unobtrusively with dignity and enterprise, always with the thought uppermost of how best can be served those interests for which we find ourselves responsible. Our influence, penetrating as it does amongst the thinkers and leaders of every human activity, is immeasurable; our principal reward the satisfaction in the achievement of something worth doing.

In this section of the British press, of which any nation might well be proud, is a force which, collectively, has never yet been exploited to the full. But I am confident that having regard to the comparatively small expenditure of manpower and material involved, no part of the community makes a greater contribution to our modern civilisation.

THE CHAIRMAN: You will have gathered, Mr. Dangerfield, from the wrapt attention with which your every word has been followed how grateful the audience is to you for a very remarkable summary of a subject which, so far as I know, has not in recent years been dealt with either so adequately or so fully. It merely remains for me to express our gratitude to you for your most interesting Paper.

The vote of thanks was carried with acclamation, and after a vote of thanks had been accorded the Chairman, the meeting terminated.

OBITUARY

OLIVER LUCAS.—We regret to announce the sudden death, on March 20th, at Nassau, in the Bahamas, of Mr. Oliver Lucas, for forty years a member of the firm of Joseph Lucas, Ltd., of Birmingham, and for the last twenty-five years joint Managing Director of the Lucas group. He had been a Fellow of the Society since 1922.

Lucas had seen the growth of his company from a payroll of 2,800 to over 30,000, much of the expansion being due to his own acute and creative brain. Among his inventions were the dip and switch anti-dazzle system for car head lamps, and the now universally adopted system of traffic indicators on cars, together with a whole host of ideas ranging from flat-topped beam foglamps to fuel injection equipment on diesels and from cycle bells to injection and combustion equipment for gas turbines. During the war he was appointed Director of Research and Development at the Ministry of

Supply and played an important part in the development of armoured vehicle design.

SIR JOHN PERRING.—It is with regret that we have to announce the death at Worthing, on March 23rd, of Colonel Sir John Perring, D.L., J.P., who had been a Fellow of the Society since 1937.

Sir John, who was Chairman of John Perring, Ltd., and Jackaman, Ltd., will be chiefly remembered for his work on the London County Council where he sat for many years. He held the position of Chairman of the Establishment Committee for eight years. He always showed the greatest interest in welfare and human problems and many of his activities reflected this. He represented the L.C.C. on the Joint Industrial Council for Manual Workers and Non-Trading Services, and on the London District Council concerned with administrative, technical and clerical officers and was also Vice-Chairman of the County of Middlesex Territorial Cadet Association.

NOTES ON BOOKS

ALPHABET AND IMAGE (No. 6). A Quarterly Periodical edited by Robert Harling. Shenvall Press. 7s. 6d.

The number of authoritative and well printed periodicals, published quarterly, has gradually diminished during the past half century, and who can doubt that culturally we are the poorer for the loss? Yet a warning note was sounded fifty years ago when a desperate attempt was made to retrieve the fortunes of the *Savoy*. "It is not unreasonably assumed", wrote the editor, Arthur Symonds, "that those who have welcomed the *Savoy* as a quarterly will welcome it with at least equal interest as a monthly, and it is confidently hoped that the large public, to which a quarterly comes with too occasional an appeal, will appreciate the monthly publication of a periodical . . .". But the manœuvre failed to save the famous review, which died before the century was out.

Alphabet and Image, founded two years ago, has already had a longer life than the *Savoy*, and it is now so well established and has proved so valuable to students of typography, that there is every prospect that it will continue to prosper—even if its present title may perhaps be changed later on. At present no other periodical exactly corresponds to this thoughtful review which is addressed to students no less than experts on aspects of art and printing. In the current number under review—a choice publication of 96 pages—the editor, Mr. Robert Harling, contributes an admirably informative article on the type designs of Eric Gill, illustrated by examples of Gill's Sans, Perpetua and Solus types, and Mr. Vivian Ridler, in an illustrated survey, searches for the principles which guided the Victorian jobbing printers responsible for the once popular ornamental artistic printing. The *Image* side is represented by a reflective essay on Pre-Raphaelite drawings, in which Mr. John Gere dwells on the distinctive qualities in the art of Rossetti and other members of the Brotherhood; and papers are also contributed by Mr. Nicolas Bentley, Mr. S. L. Righyni and Mr. A. Hippisley-Coxe of the *News Chronicle*, who writes on the drawings of Mr. Hugh Casson.

The quarterly closes with book reviews, and several pages of Notes which are particularly interesting for a paragraph on the autocratic personality of Lord Northcliffe who figures in the latest volume of *The Times History*. This review is certainly a delightful addition to modern periodicals and is also a bargain at its annual subscription rate of 25 shillings.

N. A. D. W.

THE SIGNBOARDS OF OLD LONDON SHOPS. By Sir Ambrose Heal, F.S.A. Batsford. 1947. £3 3s.

It must be some twenty years ago since I reviewed Sir Ambrose Heal's *London Tradesmen's Cards of the XVIIIth Century*, and he has drawn again on his great collection of trade-cards in presenting this review of shop signs employed by London

tradesmen during the XVIIth and XVIIIth centuries. Very few of these shop signs remain with us to-day (the barber's pole and the optician's golden spectacles are among the rare survivals) but contemporary presentations of the great variety of signs are to be found engraved on the bill-heads and trade cards which were issued by the shop-keepers before street numbering was instituted. From the selection of these old records in the author's possession it is possible to visualize a typical cross-section of the shop signs which were in common use until the last quarter of the XVIIIth century. Those reproduced represent characteristic examples taken from a hundred and fifty trades—many of them (like the businesses of the fan, clogg, spatterdash and bellows makers) indigenous to a London which has long since vanished. Such reminders of the shop-keepers, their signs and addresses, therefore bring to light the names and associations of many forgotten streets and byways, besides recalling such ancient thoroughfares as the passages around St. Paul's Churchyard and Cheapside which survived until the holocaust of six or seven years ago. An enchanting double-page plate of Cheapside as it appeared two centuries ago, decked out with coloured signboards, points the contrast of the bleak austerity of our age with the gaiety of Johnson's.

N. A. D. W.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

TUESDAY, APRIL 13. Electrical Engineers, Institution of W.C.2. 5.30 p.m. E. M. Ler, "Future Trends in, the Design of Receiving Aerials."

Illuminating Engineering Society, at the Lighting Service Bureau, Savoy Hill, W.C.2. F. V. Hauser, "Photographic Illumination in Motion Picture Studios."

Industrial Transport Association, at the Grand Hotel, Broad Street, Bristol. 7 p.m. J. Latham, "Outline of the Brabazon Project."

WEDNESDAY, APRIL 14. Electrical Engineers, Institution of W.C.2. 5.30 p.m. Dr. W. Wanger, "Technical and Economic Aspects of the Transmission of Electrical Energy over Long Distances."

Engineers-in-Charge, Institution of St. Bride's Institute, E.C.4. 6.30 p.m. A. Cooper, "Heat Insulation Materials."

Kinematograph Society, British, at the G.B. Theatre, Wardour Street, W.1. 7.15 p.m. W. D. Wright, "Colour Vision and the Film Industry."

Petroleum, Institute of, at Manson House, Portland Place, W.1. 5.30 p.m. S. T. Minchin, "Properties of Paraffin Wax as an Effect of Composition."

Sanitary Institute, Royal, 90 Buckingham Palace Road, S.W.1. 2.30 p.m. Dr. S. G. Burgess, "The Hygiene of the Preparation, Storage and Distribution of Food."

THURSDAY, APRIL 15. Aeronautical Society, Royal, at the Institution of Civil Engineers, S.W.1. 9 p.m. E. S. Calvert, "Visual Aids for Low Visibility Conditions."

Chadwick Trust, at the University College, Gower Street, W.C.1. 2.30 p.m. Thomas Ritchie, "The Sanitation of Buildings."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. J. N. Aldington and A. J. Meadowcroft, "The Flash Tube and its Applications."

Photographic Society, Royal, 16 Princes Gate, S.W.7. 7 p.m. H. S. Tasker, "Speed and Contrast in X-Ray Work from the Standpoint of the Radiographer."

Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 6.30 p.m. "Atomic Physics" (film).

FRIDAY APRIL 16. Atomic Scientists Association at the Royal Society of Arts, W.C.2. 7.15 p.m. "Atomic Physics" (film).

Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. H. W. Bowen, "The Manufacture of Gramophone Records."

Geographical Society, Royal, S.W.7. 5.30 p.m. Commander W. E. May, "The Future of the Magnetic Compass."

Interplanetary Society, British, at St. Martin's Technical School, Charing Cross Road, W.C.2. 6.30 p.m. V. W. Slater and W. S. Wood, "High Strength Hydrogen Peroxide for Rocket Propulsion."

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. H. I. Andrews, "Locomotive Testing Plant."

Royal Institution, 21 Albemarle Street W.1. 9 p.m. E. V. Evans, "The Gas Industry."

TUESDAY, APRIL 20. Dyers and Colourists, Society of, at the St. Enoch Hotel, Glasgow. 7 p.m. G. H. Lister, "An Investigation into the Practical Aspects of the Absorption of Acid and Chrome Dyes by Wool."

Photographic Society, Royal, S.W.7. 7 p.m. Symposium on "Modern Stereoscopes and Their Applications."

WEDNESDAY, APRIL 21. Fuel Institute of, at the Institution of Mechanical Engineers, S.W.1. 2.30 p.m. Dr. D. T. A. Townend, "Recent Developments in Combustion."

Meteorological Society, Royal, S.W.7. 5 p.m. H. G. Booker, "Some Problems of Radio-Meteorology."

Radio Engineers, British Institution of, 39 Ehubank Crescent, Glasgow, C.2. 6.45 p.m. J. B. Birks, "The Physical Applications of Micro-Waves." At the Neville Hall, Westgate Road, Newcastle-on-Tyne. 6 p.m. Professor M. G. Say, "The Pulse Signal"

THURSDAY, APRIL 22. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. Dr. B. H. C. Matthews, "The Nervous System as an Electrical Instrument."

FRIDAY, APRIL 23. Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. H. O. Parrack, "Reconditioning of Worn Parts."

Photographic Society, Royal, at G.B. Theatre, Wardour Street W.1. 7 p.m. J. F. Dunn, "Progress in Reversal Film Exposure Technique"

Royal Institution, 21 Albemarle Street, W.1. 9 p.m. H. S. Commager, "The American Character in the Twentieth Century."

Sound Recording Association, British, at the Royal Society of Arts, W.C.2. 7 p.m. B. C. Sewell, "Quality Factors in Film Recording."

SATURDAY, APRIL 24. Chemical Engineers, Institution of, at the Geological Society, W.1. 5.30 p.m. S. H. Wilkes, "Dust Explosions in Factories."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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FRIDAY, APRIL 23rd, 1948

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:

MONDAY, APRIL 26TH, at 4.30 p.m. (*Last of three Cantor Lectures*).—"RECENT ADVANCES IN ANÆSTHESIA", by Frankis T. Evans, M.B., B.S., D.A. The lecture will be illustrated by lantern slides.

WEDNESDAY, APRIL 28TH, at 2.30 p.m.—Craftsmanship.—(vii) "CRAFTSMANSHIP IN FURNITURE—TRADITIONAL AND MODERN", by R. W. Symonds, L.R.I.B.A. John Gloag, HON.A.R.I.B.A., will preside. The lecture will be illustrated by lantern slides.

WEDNESDAY, MAY 5TH, at 2.30 p.m. (*Sir William Jackson Pope Memorial Lecture*).—"RECENT ADVANCES IN STEREOCHEMISTRY", by F. G. Mann, SC.D., PH.D., F.R.S. C. S. Gibson, O.B.E., M.A., SC.D., F.R.S., Professor of Chemistry in the University of London at Guy's Hospital, will preside. The lecture will be illustrated.

THURSDAY, MAY 6TH, at 2.30 p.m. (India, Pakistan and Burma Section).—"THE HOUSE OF TATA—60 YEARS' INDUSTRIAL DEVELOPMENT IN INDIA," by Sir Frederick James, O.B.E. Sir Homi Mody, K.B.E., will preside.

MEETING OF COUNCIL

A meeting of Council was held on Monday, April 12th, 1948. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Mr. F. H. Andrews; Sir Frank Brown; Major W. H. Cadman; Sir Edward Crowe; Professor E. C. Dodds; Sir Thomas Dunlop; Captain L. G. Garbett; Sir William Halcrow; Dame Caroline Haslett; Dr. R. W. Holland; Mr. Basil Ionides; Mr. F. A. Mercer; Sir Ernest Pooley; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. J. G. Wilson, and Miss Anna Zinkeisen, with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Anglesey, The Marquess of, Llanfairpwll, Isle of Anglesey.
Anson, Sir Edward Reynell, BT., Taunton, Somerset.
Anthony, Lieut.-Colonel Herbert Douglas, M.A., B.SC., PH.D., Reading, Berks.
Apperley, George Owen Wynne, R.I., Tangier, Morocco.
Arcedeckne-Butler, Major-General St John Desmond, C.B.E., Killinick, Eire.
Bedford, Leslie Herbert, O.B.E., M.A., B.SC., London.
Beesley, Reginald Horatio, South Merstham, Surrey.
Blakeley, John Dyson, M.SC., London.
Brayshaw, Ronald Lacey, Guiseley, Yorks.
Broadbent, Frank, B.SC., Huddersfield, Yorks.
Castle, Peter Endsleigh, London.

Chappell, Donald Arthur, Dartford, Kent.
 Coombs, David John, Pembridge, Staffs.
 Cotterell, William James, Riviera, Johannesburg, S. Africa.
 Davies, Glyn, Newtown, Montgomeryshire.
 Douglas, Allan, M.A., Liversedge, Yorks.
 Durov, Miss Q., London.
 Fillingham, Kenneth Herbert, Blackpool, Lancs.
 Fisher, Charles Frederick, Kirkby, Liverpool.
 Franks, Miss Ruth MacLachlan, M.A., PH.D., Toronto, Canada.
 Garbett, Captain Leonard Gillilan, C.B.E., R.N.(RETD.), Ledbury, Herefords.
 Goonetilleke, The Hon. Sir Oliver, K.C.M.G., K.B.E., Colombo, Ceylon.
 Gould, Mortimer Edward, Twickenham, Middlesex.
 Grice, William Stanley, M.C., F.R.I.B.A., London.
 Hagart, Andrew Mackie, B.COM., Johannesburg, S. Africa.
 Hartley, Christopher, Oakworth, Yorks.
 Hodgkin, Jonathan Edward, J.P., Bishop Auckland, Co. Durham.
 Kulkarni, Shankar Balwantrao, Nagpur, India.
 Littlefield, Robert Southern, North Shields, Northumberland.
 Macarthur, James, Sydney, Australia.
 Martin, Clifford Barnard, London.
 Percival, William Hudson, Doncaster, Yorks.
 Pereira, Stany, London.
 Robbins, Eduard Rubini, London.
 Roff, Ernest Avery, B.Sc., Orpington, Kent.
 Scheel, Count Ove Vilhelm, St. Albans, Herts.
 Sen, Professor Binayendra Nath, M.Sc., PH.D., Bengal, India.
 Spooner, Professor Edgar Clynton Ross, B.E., M.Sc., D.PHIL., Adelaide, South Australia.
 Starling, Leonard Walter, London.
 Storey, Harold Ernest, Enfield, Middx.
 Tester, Merton Philip, B.A., London.
 Walters, Walter Eric, London.
 Winship, George Edward Warrington, Harefield, Middx.
 Wredden, Joseph Vivian High, Bedford.
 Yates, William Arthur, Windsor, Berks.

Further consideration was given to the award of the Albert Medal for 1948.

Preparations for the Balloting List for the new Council were begun by declaring vacancies.

It was announced that 27,014 entries had been received for the Society's Whitsuntide examinations as compared with 22,629 in 1947. Owing to the small number of eligible candidates in recent years it was decided temporarily to suspend the offer of the Duke of Connaught Prizes after the 1948 examination.

The offer of the International Summer Schools Society to award 'Travelling Bursaries in connection with the Society's examinations in Modern Languages was gratefully accepted.

A quantity of formal and financial business was also transacted.

THE SOCIETY'S ADDRESS TO H.M. THE KING

The preparation of the Society's Address to His Majesty the King on the occasion of the celebration of Their Majestys' twenty-fifth wedding anniversary was entrusted to Mr. Percy Smith, R.D.I. An illustration of the Address is given on the following page.

TO HIS MOST GRACIOUS MAJESTY THE KING

May it please Your Majesty,

WE Your Majesty's most dutiful and loyal subjects, the Council and Fellows of the Royal Society for the Encouragement of Arts, Manufactures & Commerce, humbly tender to Your Majesty and to Her Majesty The Queen our respectful congratulations on the occasion of the celebration of the twenty-fifth anniversary of Your Majesties wedding.

WE never fail to remember with gratitude the very close link we have always had with Your Majesty's Family. We are honoured indeed that Your Majesty is our Patron, and that Her Royal Highness The Princess Elizabeth, your daughter, is our illustrious President. Moreover, it is ever present in our memories that it was to the energy and foresight of Your Majesty's illustrious great-grandfather, whom it was the Society's privilege to have as its Royal President at that time, that the Great Exhibition of 1851 was successfully launched. That Exhibition, the centenary of which will shortly be celebrated, has always stood as a symbol of the interests which the Society has so much at heart.

FOR nearly two hundred years the Society has been engaged in promoting the welfare of Your Majesty's people in a variety of ways. In all such matters Your Majesty has always taken the deepest interest, and the Fellows of the Society have therefore special cause to unite with their fellow subjects throughout the Empire in earnest prayer for Your Majesties continued peace, well-being, & happiness for many more years to come.

Signed with the Seal of the Royal Society
for the Encouragement of Arts, Manufactures
& Commerce this twelfth day of April, 1948,
in the presence of

H. P. Lindsay

Chairman of Council

E. F. Crowe

Member of Council

K. S. Lindholm

Secretary of Society

R.D.I. EXHIBITION

An important development in connection with the R.D.I. Exhibition in October and November next has recently taken place. The Council of Industrial Design have offered to become co-sponsors of the Exhibition with the Royal Society of Arts and to share the financial commitments, and their co-operation has been warmly welcomed by the two original partners in the scheme, the Royal Society of Arts and the Faculty of Royal Designers for Industry.

Three appointments have also been made for the organisation of the exhibition. Mr. Milner Gray, R.D.I., has been appointed Designer-in-Charge, Mr. Ashley Havinden, R.D.I., has undertaken responsibility for publicity, and the administrative work is being undertaken by Miss Dorothy Goslett and members of the Design Research Unit.

FESTIVAL OF BRITAIN, 1951

The close association of the Royal Society of Arts with the 1951 Exhibition, now more appropriately known as the Festival of Britain, 1951, as it will comprise several separate exhibitions, has been marked by two recent appointments. The Chairman of Council, Sir Harry Lindsay, has been invited to join the General Council of the Festival, and the Council of the Society, on the invitation of the Lord President of the Council, have appointed Sir Frank Smith, F.R.S., to represent the Society on the Council for the Exhibition of Science and Technology which is to form part of the Festival.

DESIGN IN SCANDINAVIA

Travel reports by four prizewinners in the Society's Industrial Art Bursaries Competition

Twelfth Ordinary Meeting, Wednesday, February 18th, 1948

Mr. OSWALD MILNE, F.R.I.B.A., *in the Chair*

THE CHAIRMAN: We are met together this afternoon to hear papers read by four of the designers who have won bursaries which have been organised by this Society. I think it is a matter of interest to remember that the aim of this Society, when founded nearly 200 years ago, was to encourage and improve art and industry. One of its first activities, in those early days, was to give prizes to encourage the study of drawing, it being felt that in the industries drawing was very necessary. Among some of the first students—they were almost children—who won prizes offered by this Society were Richard Cosway and John Smart who, later on, became very famous artists. Another student was Marjorie Moser and we have an example of the work which she submitted to the Society in these drawing competitions; later on she became an R.A. In spite of the great extension of the work of this Society in many other directions, it has always kept its interest in promoting art in industry; but with changing times it has changed its methods of encouragement. Early in this century we were giving prizes—money and book prizes—to art students who entered competitions. Later on, when this matter was reviewed, it was felt, that although these prizes might encourage the young artists, they did not contribute much to carrying on and improving their education in design for particular industries. Therefore, instead of giving prizes of that sort, the Society determined to give both scholarships and travelling bursaries to winners in particular competitions to do with particular trades.

For the industrial artist there was little provision for bursaries or scholarships by which to further their education. It was to fill that gap, this Society promoted these bursaries and travelling studentships. They were started about 1938 and were carried on up till the war, even into the early years of the war. Then, of course, the war took all the students away from the schools and occupied all the time of those who had just won bursaries. It was only after the war that some of the competitors were able to take advantage of the bursaries they had won. This afternoon we are going to hear the experiences of four of those students who have been enabled to travel as a result of their successes in different competitions.

The first of these four is Mr. Booth who was formerly a student at the Edinburgh School of Art. He was awarded a scholarship of £100 in 1939 for the designing of furnishing textiles and is now teaching at Rochdale School of Art. He will be giving an account of his journey to Denmark, Norway and Sweden.

Secondly we have Mrs. Winifred Ives, who was formerly a student at the Edinburgh School of Art. She won a travelling studentship of £100 in 1939 for pottery designing.

Our third student is Miss Reeve Ronder, who was also a student at the Edinburgh College of Art and shared with another student a scholarship of £100 given in 1940 for design in furnishing textiles.

Finally, we have Mr. Leslie Morton, who was a student at the St. John's School of Arts and Crafts and the Birmingham School of Furniture. He is shortly starting at the Architectural Association School. He won a £150 scholarship in 1946 for furniture designing.

The following four papers were then read:

A TRAVEL REPORT ON DESIGN IN SCANDINAVIA

By HARRY BOOTH, *winner of scholarship, 1939, in furnishing textile section*

While visiting Scandinavia during the month of August last year, I spent five days in Denmark, five days in Norway and two weeks in Sweden. My first personal contact, however, was to take place on the boat train to Harwich. A young Danish school-teacher occupying the opposite seat, returning home after spending some few days in South Wales, had acquired, besides a distinct dislike of our bread and an admiration for our people, a pronounced Welsh accent! At Esbjerg it was a small incident which was to sum up immediately for me what the coming weeks had in store. In the station café a request for a glass of milk met with the murmured apology: "I'm sorry, sir, we have only cream!" The journey from Esbjerg to Copenhagen was by rail and ferry steamer and the tour had really begun.

I stayed near the centre of the city in order to be near the studios, shops and workshops to which I paid visits each day.

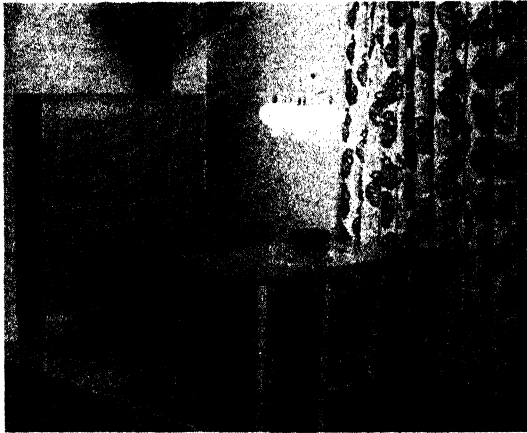
When considering Danish domestic design we must realise that most Danes live in flats, providing problems peculiar to flats, and with which only comparatively few of us here are directly concerned. Central heating being widely used, there ceases to be a focal point, such as a fire place in each room. Instead a greater sense of mobility is felt and a broader planning scope is evident. The longer winters and brief warm summers have influenced the size of the windows—now large and undivided—and have encouraged the cultivation of plant life indoors. Indeed, the Danish housewife appears to lavish as much attention upon her cacti and miniature indoor garden as does the traditional Yorkshireman upon his whippet. This love of natural forms is strongly evidenced by the trend of printed fabrics both in form

and colour. It can be said generally of Danish prints that there is little conventionalising of nature, seldom is use made of pure abstract forms, and almost always colour is light in tone and cool.

Danish furniture is functional yet not stark, and full play is given to the natural beauty of the wood. A familiar item of furniture in the Danish home is the hand loom.

The "Handaarbejdet Fremme" is a Society organised to encourage hand weaving and embroidery. Women work at home and dispose of their craftwork in a large store in the Kongens Nytorv near the centre of Copenhagen. A high standard is required, and while reminiscent in style of traditional crafts, the work is fresh in approach, clean in colour and vigorous in treatment. Such is the influence of this type of work that the national crafts have been preserved and the second-rate eliminated from the home.

Quite the most influential, the most original and tasteful of these shops is the



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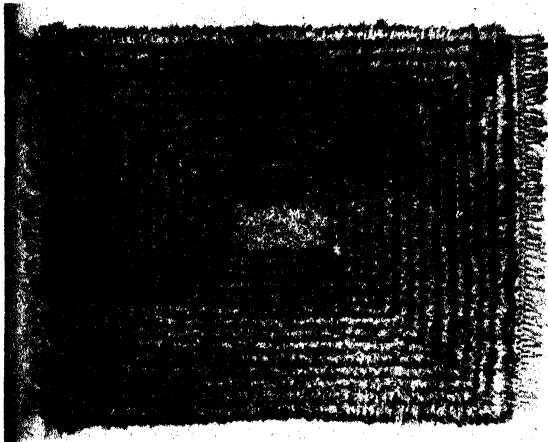
FIG. 1.—A Swedish dining-room. "Triva" Knock-down furniture in elm and birch; drapery of printed linen. Architect: Elias Svedberg

"Den Permanente". This is not a shop in the pure sense but is a permanent exhibition. Exhibits from all over the country, the work of individuals as well as leading art and handicraft firms, provided they pass the very stringent test imposed, are here for sale. Complete interior schemes are displayed and may be purchased in their entirety or piecemeal. I chose a simple little pottery condiment set, but would have preferred a carpet or some furniture. Of the textile designers exhibiting there, Marie Gudme Leth appears to be not only the most popular but also the most prolific. Her work typifies the prevailing spirit with regard to colour, which is fresh, cool and shows a preference for green and yellows. The printed fabrics rely for their effect upon a narrow colour range based upon the greens of Danish plant life. The trend appears to favour a simple arrangement of flower motifs, screen printed with repeats of large dimension and often one colour prints. Discharge and

resist work provides the thin white lines on blue and green grounds so well liked in Denmark. This general effect of brightness, of green and blue-green colour, the absence of full, rich, warm hues, the preference for natural forms is no doubt due to the excellence of the flower displays in the Danish shops and the inherent love of plant life in the Danish home.

Window display in Copenhagen reaches ambitious proportions. Straw, papier mâché, cane fabrics and panel boarding are used in profusion, and animals are modelled so large and quaint they might have wandered in from some Southern European Carnival.

I found the high esteem that Danish silversmiths enjoy in no way exaggerated and the workshops of Hans Hansen and Georg Jensen are a joy to behold. Not knowing the conditions of import I was hesitant to purchase silver jewellery, but later, in Gothenburg, I found myself with ten Swedish kroner I had to dispose



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FIG. 2.—"Labryinth". Rya rug in white, black and yellow. Designed by Viola Grasten

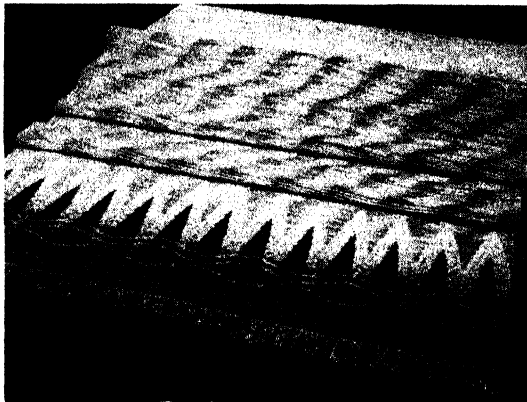
of and decided to buy some. In a store there I purchased six Danish silver teaspoons of exquisite design and craftsmanship for my ten shillings.

I made the journey from Copenhagen to Stockholm *via* ferry to Malmo, and then by electric train, the trip lasting about seven hours. It was a train notable for its speed and cleanliness. Its lace headrests are changed each trip, and the journey was memorable because of the plains, yellow in the sun, the lakes and many rapid rivers, the forests of Christmas trees and the tiny hamlets of Indian red wooden houses, the white and red barns. My first evening in Stockholm will be remembered for the fairyland appearance of its neon-lighted streets and shops, its cafés on the high flat roofs.

At the first opportunity I contacted the Swedish Arts and Crafts Society—Svenska Slöjdföreningen—where Mr. Hald and Miss Hallen, his secretary, gave me every assistance. Apart from freedom to study in the extensive library of the

Society I was able to discuss with the staff their research problems and present-day trends in Swedish Industrial Design. It was here that I found the Swedish Art Schools have not the same standing as have our Schools of Art. Indeed it was surprising to find the Stockholm School of Art is considered to be unimaginative and dull and produces work of inferior quality. Two days were spent here in the central office of the organisation and a better grounding for the days to follow I cannot imagine. I can thoroughly recommend that a student makes fullest use of all that the Swedish Arts and Crafts Society has to offer, for it is here that one is brought into immediate and full contact with all that is good in the spirit of modern Sweden.

In Sweden art criticism reaches a high standard and is given a good deal of space in magazines and newspapers. Of the former quite the best of its type I came across was "Form", issued by the Swedish Arts and Crafts. In addition, large industrial firms have formed Art Associations with whose help factories and offices



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FIG. 3.—A hand woven rug in tones of grey with a border at one side only in deep maroon. Designed by Astrid Sampe-Hultberg

are provided with works of art, cafes with pictures, etc., in much the same way as the Victoria and Albert supplies schools with specimens. Stockholm, a city of only 600,000 people, through its contact with the sea is imbued with a feeling for nature, one of many things the Swedes have in common with the Danes.

The Swede is deeply rooted in his home country. The younger artists seeking new forms of expression find them not only in the old folk-art, the primitive wood carvings in country churches, in peasant painting, and in the preserved farm houses of Stockholm's Skansen, but also in the home industries so highly developed in Sweden, preserving a creative power long lost in other countries. His love of the open air, of plants and flowers, has made him critical of his parks and town squares now kept fresh with portable concrete pre-cast gardens. Open-air cafes are gay and colourful with plant life, sunshades and window blinds are striped in reds and whites. There is no fear that advertisements will clash with such a scheme—they

appear to be too well controlled. Gothenburg displays its posters on a large revolving upright cylinder near the Railway Station and Post Office, but apparently nowhere else.

Collaboration between art and industry is a recent phenomenon. But, before this, the manufacture of textiles had reached a high artistic standard. In technique and style the Swedish Textile Industry derives from the home-crafts, finding inspiration in the traditional styles and patterns. Not only home-slojd proper but modern hand-weaving and industrial manufacture as well are on a high plane to-day, the two latter having found their own special modes of expression. Formerly there was great variety of motif and technique in the various provinces but now the patterns are common property throughout the country, and both from the point of view of quality and quantity home-slojd may be said to be enjoying a renaissance providing a means of livelihood for many thousands of people. Almost everywhere one can come across artists working lovingly and industriously. Here is a living art and a living culture, and while not dependent upon foreign styles, the results are far from being slavish imitations of the traditional home-slojd products.

Collaboration of a different sort between architect, painter and sculptor produces corporate works such as the new crematorium in the forest cemetery near Stockholm, one of the most important architectural achievements of our time. Mural painter Erixson, besides a fresco in the crematorium has produced designs for the tapestries in the concert house in Gothenburg in a style full of vitality and showing a strong kinship with primitive folk-painting.

Of the stores in Stockholm, Nordiska Kompaniet is not only the largest but also the most important and influential as regards style. Here the textile workshop under the guidance of Astrid Sampe-Hultberg proved very stimulating. For several days I was allowed access to the workshop, its libraries and records, and I spent many hours there. Experiment coupled with a high degree of technical excellence and an infallible taste, produces work of an uncommonly high standard. Quite a number of the hand-loom weavers are refugees from the Baltic States and have brought into their work a flavour that is fresh yet still in harmony with traditional Swedish design. Of the individual designers in this category who have risen to the highest rank is Viola Grasten, a Finnish artist who specialises in Rya rugs chiefly in black, white and tones of grey. Amongst other designers of note Mrs. A. Sampe-Hultberg herself, Elsa Guelberg, who is now specialising in large, screen-printed portières, Sofia Widen of Licism, doing chiefly ecclesiastical work, and Barbro Nilsen, who has some tapestries in the concert hall in Gothenburg, have done much to emphasise the importance of rationality of form and the dignified treatment of materials.

In the midst of all this I must mention the pleasure it afforded me to see so many well-designed British leather goods and Manchester corduroys on sale in the Swedish shops and held in high esteem by the people there. This appreciative quality was shown too by a remark from an N. K. designer, "We have every admiration for the Danes, they have such exquisite taste", and that I think is the root of it all.

Regrettably Norway had little to offer in the way of original designs—much of her goods on display was of poor, unimaginative quality—and it was here for the

first time that I saw in any appreciable amount the type of pseudo-handcraft of which we see too much here in England.

My one outstanding memory is a purely personal one—it is of the country that swept by the observation window of the train as we approached Oslo—a scene of indescribable beauty, the work of the most competent of all designers.

I arrived at Newcastle heralded by fog horns, gloom, smoke and dust; my immediate welcome, a long train journey and a new school term before me.

REPORT OF VISIT TO ROYAL COPENHAGEN PORCELAIN WORKS

By WINIFRED E. IVES, *winner of travelling studentship, 1939, in pottery group*

I reached Copenhagen on Thursday evening, August 14th, and with the assistance of a Danish friend of my student days in Edinburgh, contacted Mr. Buchardt, the secretary of the works, and made an appointment to see him on the Saturday morning.

Accommodation had been found for me by the factory at a Pension in the Hellerup district, three-quarters of an hour's ride away by tram on the other side of the city. So, each day on my way to and from Smallegade, I passed through and became familiar with the city's many renowned buildings and thoroughfares. And soon, except for the language, began to feel as if I "belonged".

Mr. Christensen was on holiday in Norway at this time, and on Monday, August 18th, Mr. Buchardt introduced me to Mr. Bredo Grandjean, the keeper of the Archives, who spoke English well, and took me on a tour of the most interesting parts of the factory. I met many of the artists and technicians at lunch in the dining-room, and then spent a pleasant afternoon in the Museum and the very comprehensive Library.

The factory buildings extend over a large area, 40,000 square metres, situated beside the Frederiksberg Gardens, and close to the Zoological Gardens. Here it has stood since 1884. The main gateway leads straight off the tram route and the centre of industry is reached almost at once. In the huge kiln section the ovens are built right up through three storeys. There are seven of these; some burning oil, some coal, and some Danish peat briquettes. The fire is in the topmost storey and there are packing chambers on each floor. So, while working in the factory, one often passes through the bustling activity round these kilns, which are always a centre of interest especially when, after the roar and blaze of the firing is over, the ware is "drawn", and one sees the results of careful work. On the days of a poor firing everyone is "down" and likewise on opening a good kiln the artists and technicians seem to radiate cheerfulness.

I worked at the factory regularly from 9.30 a.m. till 4 p.m. most days of the week, fitting in as many visits to Museums and Exhibitions and other places of interest as possible. It was a very full and enthralling time-table.

On Tuesday, August 19th, I was introduced to Mr. Nils Thorsson, the chief painter and designer, and although he could speak little English, and I little Danish, I was under his tuition and guidance for the most part of my stay, and learnt a great deal from him.

At first, I worked in his small studio which was always busy with artists, technicians, chemists, and engineers constantly coming in to discuss things.

Here, the first day, when they found I was interested in figure modelling and design, clays of different quality were brought to me, and I chose the rich dark grey stoneware mixture, used mostly by the animal sculptors; but actually I did more work in the less pliable white earthenware clay—a new mixture which had the advantage of being more quickly dried and fired. I was vividly aware of the shortness of time at my disposal to see any of my own work through to its finished stage, and had to “ration” myself to a little of the stoneware and faïence sections and did not touch upon, save to admire, the more intricate processes of the porcelain departments.

The factory produces a wonderful variety of ware, each separately of an extremely high rank, and their Museum and showrooms are a joy to walk round. There is to begin with the famous “Flora Danica” service commenced in 1790, each piece

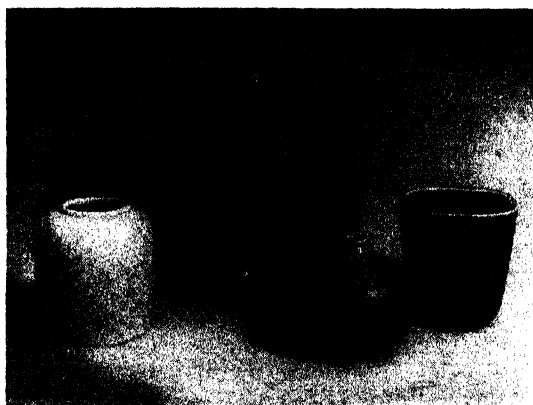


FIG. 4.—*Royal Copenhagen stoneware designed by Nils Thorsson*

a delicately painted natural flower. Dating from the time of the great mineralogist, Frantz Henrich Müller (under whom the factory began its life in 1775), is also the “Blue Fluted” service, all hand-painted and still being produced to-day. Then, in the less expensive but beautiful earthenware, is the “Tranquebar” service inspired by the old East Indian blue porcelain from the Danish possession of that name. And, of course, there are the great variety of more recent table productions: the “Bellona” and “May” and “Marigold” services by Nils Thorsson and the “Quaking Grass”, the “Karup” and the “Stauder” sets by Thorkold Olsen, to mention only a few.

There are so many lovely things, all the beautiful “Blanc de Chine” porcelain figures, and the vast range of exquisite porcelain animals and figures, fauns and fishes, among them works by Arno Malinowski, Gerhard Henning, Kai Nielsen and Georg Thylstrup.

There is also a staff of first-rate artists painting the blue-green-grey underglaze pictures, immortalizing Danish scenery on porcelain vases, large and

small. These men and women work in long airy rooms surrounded by flowers and climbing plants, which the Danes love to have about them. Here, not far from the kiln buildings, the leading underglaze artists, Mr. Ricard Bocher and Mr. Th. Kjølnér, have their studios. This same quiet pervades the rooms where neat-fingered women fashion the tiny chains of flowers that are fixed to the cast portion of such dainty figures as those modelled by Carl Martin Hansen and Gerhard Henning.

The pottery and sculptures of the stoneware section are, perhaps, the most fascinating of all the factory's productions. Though this is a comparatively new output and only came into full swing with the Swede, Patrick Nordström, in 1912. But now there is a fine range of animal sculptures, and especially remarkable are the ones by the sculptor and ceramist, Knud Kyhn, and among the well-known pieces by Jais Nielsen are such forceful figures as the "Good Samaritan", "Moses" and "Pontius Pilate".

On Wednesday, August 27th, I was taken to the stoneware section, called the



FIG. 5.—"Bear" by Knud Kyhn in stoneware,
(Royal Copenhagen) glazed with "Sung" glaze

"Cellar," and introduced to Mr. K. Bloch, the master potter; his young assistant Eben and Miss Gerd Bogelünd, an able young designer in stoneware, were my daily companions.

Nearly everything in this department is done by hand, as it has been for many centuries. The pottery wheels here were not power driven, and first, I had to learn the knack of kicking properly with my feet. Here, I revised and learnt many simple things to do with the making of different forms and the handling of material, and for the first time used discs of plaster-of-paris as a base on which to "throw" my pot, so that it would not get damaged in the slightest while being lifted off the wheel. And I learnt to use thin tools of tin and copper sheeting for the final "turning" and cleaning up of the hardening pot, and several new hints on how to treat hand-pulled handles.

During this time, I watched and noted the Danish methods carefully, and also managed to "throw" a few stoneware shapes upon the wheel myself. I made some

little mugs, some tankards and some large faïence wall plates. I wanted the stoneware shapes chiefly that I might try out on them some of the factory's many glazes.

Among these glazes are the "Solfatara", a green brimstone colour, sometimes changing like molten lava to almost black and made by H. Madslund, using one of the most difficult and rarest of metallic oxides as its foundation. These glazes fire at a temperature between 1,300° to 1,400° Centigrade, and the shape needs to be strong and true to withstand it. Thin forms easily warp.

The "Sung" glaze, of a deep brownish-blue varying quality, is used on many of the sturdy animal sculptures by Knud Kyhn, such as his "Bear" and "Monkey".

The Copenhagen factory readily admits that it seeks inspiration from the works of the ancient Chinese, and the lovely "Golden Hares Fur" and the "Clair de Lune" by Madslund, and the "Celadon" by O. Mathiesen can be favourably compared to any of the genuine Chinese originals. Then there is the rich "ox blood" which depends entirely on the firing whether it turns out red or green, and the "deep blue" created by Patrick Nordstrøm.

All these glazes are in present production, but the firings are often placed weeks apart, and I was only able to have my samples dipped in a few. Glazing the stoneware was also done by K. Bloch in the "Cellar", but glaze ingredients are always deeply guarded secrets and I learnt little on this subject.

The laboratories in the factory are light spacious rooms and I met the engineers and chemists at various times.

The young chemist Miss E. Ramussen created the new clear faïence glaze which was just available in time to try on some of the small figures that I modelled in their new earthenware clay.

On September 10th, I went to see Mr. Christensen, who had returned from Norway and had a long and interesting talk with him in his office. He expressed the wish that I should get the very most out of my visit in every way and checked over my activities and suggested additions to the programme. He also urged me to visit the many prominent artists, watch and question them, while actually at work in their studios. During the following weeks I tried to do this and learnt and discussed with them at close hand how exactly they set about their work.

The underglaze painters, Ricard Bocher, Th. Kjolner and Kai Lange, spend the most part of their summer vacation sketching out of doors and bring back to their work fresh pictures and ideas. The factory has been famous for these countryside and coastal scenes since 1780. Only three colours are used in underglaze painting on porcelain, blue, green and brown (made with pure gold as its foundation). The air spray is used a lot for softening effects.

Kai Lange, overglaze painter and designer, was painting a gold medallion picture of old Danish buildings, on a large cream Craquelé vase, when I visited him. He showed me some of his experiments with coloured slip decoration on faïence table ware.

Mr. Williamson, son of the old Danish painter whose work was on exhibition just before I arrived, builds lively models direct in rough stoneware. There are quite a number of these humorous groups on display in the factory's shop in Amagertorv.

Thorkild Olsen, artist and overglaze painter, has an intimate knowledge of botany. In overglaze painting on porcelain the artist can command many more colours than in underglaze painting.

Nils Thorsson's work covers a varied range of ceramic art. He paints, designs, and models. I had plenty of opportunity to watch him at work and admire the alertness of his mind. He is continually experimenting with new forms, new methods, and new glazes, and I should like to have studied under him much longer.

By the end of August a studio had been found for me, where I was able to carry out a few figure designs. As soon as these had dried and passed through the biscuit firing, it was necessary to return to Nils Thorsson's studio to apply the colours, jars and bottles of which were stacked upon his tables.

The colours I was to use were first tested on pieces of biscuit, and while waiting



FIG. 6.—*Royal Copenhagen dinner service with underglaze decoration, by Thorkild Olsen*

for these, I started a series of designs for the decoration of a "Children's table service", using a "Wild Horse" motif in bright colours.

The two recent faience glazes made by Miss Rasmussen were tested on the first few plates, producing quite different effects on the colours. The artists were all interested in this effort and came in often to see me at work.

I painted, tested, painted again, and soon the set ran into six of each piece and eventually totalled some 91 pieces before I came away. They covered the table and the floor! I did not see the final results, as I had to leave Copenhagen before they were taken from the glaze firing.

On my last day at the factory, the artists and technicians, who I had come to know quite well by this time, gave an informal "farewell" lunch party in my honour. They toasted "Mrs. Ives" in true Danish fashion with flags and schnapps and many speeches! And I was very sad to leave.

NOTES ON SWEDEN, 1947

By REEVA RONDER, *winner of scholarship, 1940, in furnishing textiles group*

The visitor to Sweden cannot fail to be carried away by the difference between life in this hard-pressed rain-soaked and grimy island and the long sunny days and bright-clean tints of a happier land. And, indeed, what greater contrast could be imagined than between the abysmal grime of Newcastle's dockland or the endless dreariness of London's suburbs and the first bright glimpses of Scandinavia, whether they be Oslo's Fjord, Stockholm's Archipelago, or the striped awnings and white paint of Bromma airport. The contrast is there and the visitor reacts in either of two ways—perhaps, paradoxically, in both ways at once.

Sweden is Paradise and Swedes are wonderful. Prosperous, cultured, equalitarian, and fastidiously clean, here, surely, is a people that can show the world the true way of life. But then the seeds of doubt are sown and one wonders—have they not been lucky, perhaps a little cunning, in avoiding two major wars? Again, was



FIG. 7.—Poster display stands in Nybroplan, Stockholm

it not luck that gave them water power, a balanced economy, and avoided the evils of the Industrial Revolution?

It is, of course, a case of first impressions being wrong. But because I believe firmly that a people's artistic achievements cannot be understood and appreciated without a knowledge of the social background on which they were built, I feel it is necessary to say something of my impressions in this direction.

Sweden is, I think, a superb example of a working Social Democracy. She is, of course, a parliamentary democracy of long standing, and had already adopted an advanced liberalising internal policy by the turn of the century. The growth of the co-operative movement into a strong, virile and progressive organisation was and is a marked feature of life. A further great step forward was taken when, after the world depression and the Kruger Match Scandals, Sweden, in contrast to other countries' financial economies, embarked on a bold policy of full employment, public works and partial nationalisation. Thus, she achieved a measure of social progress in stable times a decade before the New Deal in America and fifteen years before our own efforts in difficult world circumstances.

It is, of course, undeniable that Sweden has benefited enormously through not being involved in war. Nevertheless, the results of her conscious policy are tangible and obvious. No poor can be seen in the streets of Stockholm. Everyone is freshly, if not luxuriously turned out. Two-thirds at least of the town is comparatively new, in a homogeneous contemporary style.

One noteworthy result has been the general levelling *up* of incomes. The wages of workman and artisan are high and comparable with those of the professional worker, and there is no particular financial attraction in belonging to the black-coated classes, the result being, of course, that only those with special capabilities are attracted to the professions, their numbers are comparatively small and their work is widely known and appreciated.

Much more could be said on life in Sweden, but a survey of this nature must of necessity be brief. I should just like to mention some salient points which occurred to me, such as, the general cleanliness and clarity of the atmosphere, largely due to the amount of electrification, making the use of bright colours in print and textiles possible—a possibility which is exploited to the full.

Then there is a social consciousness which is not as yet developed here. Not for the Swedes the unseemly commercial brawling of Neon signs on the pre-war Piccadilly scale, nor the awful writings on the wall which grace or disgrace our buildings, nor the wilful destruction of shrubs and flowers in street or park.

Thirdly, there is the existence of pressures, perhaps inevitable in an advanced society. The most visible sign of this is the extremely high divorce rate. It is perhaps an attempt at compensation for this that so much care and attention is lavished on the children. Almost every block of flats and every group of houses has its play-garden with paddling pool, sand-pit and games enclosure surrounded by the most delightful and imaginative equipment possible.

As for the arts of Sweden, their beginnings, early in the century, were, like the growing co-operative movement, essentially of folk origin. The first revolts against nineteenth century copyings and revivals sought its inspiration in the folk art of the heart of Sweden, the work of the peasants of Dalarna and other provinces. Based on these traditional motifs and geometrical patterns, this romantic period has now passed into history but its effect lingers on, valuable in so far as it has encouraged a broad-based appreciation of the arts, a fine sense of local tradition and a care for that sense of craftsmanship which is so lacking here. And it is dangerous too, because so many of the folk shops which are scattered about the provincial towns have degenerated into touristy junk shops where the local souvenirs in the form of toy horses, wooden spoons and table centres are peddled to the summer visitor.

The triumph of this period is, of course, the magnificent Stockholm Town Hall where the skill of artist craftsmen in stone, mosaic, wood, and cloth was gathered together by Östberg to help make one of the fine buildings of the world.

The phase of inspiration drawn from her own resources was superseded during the twenties by a turning towards the classical culture of the Mediterranean. This was the period when the old forms of acanthus and honeysuckle were used, but in a new, fresh and delicate manner which are still to the fore in Stockholm in the immensely long and slender Corinthian columns of the Concert House.

Action begets reaction, and in the 'thirties the creed of functionalism was wholeheartedly embraced by the Swedes. It had the very real merit of being a style, which owed little to past tradition but was at least an attempt at contemporary expression. But functionalism, if it means only the satisfaction of materialistic needs, is a creed lacking in the warmth of life, and having too aseptic, too hygienic an atmosphere for the designer to exist in in comfort. The textiles of this period are pleasant enough, and always in the best of taste. White and off-white are the predominating tones and the design motif a simple repetitive pattern of dots or monogram-like forms. This is the style which is most in evidence in the materials which exist and are in use to-day.

But already a change has taken place. Once more the pendulum has swung. The Swedes have realised that functionalism is not enough, that the bare bones of

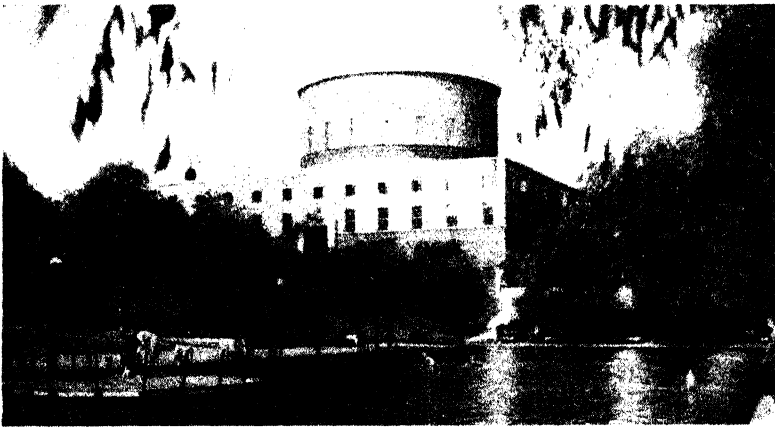


FIG. 8.—Children's paddling pool near the Central Library, Stockholm

necessity and use must be clothed in the warm flesh of design, colour and positive, conscious beauty. To do this their designers have gone back, as designers always will, to the shapes and forms suggested by nature.

This new attitude and humanism has been described as the "New Empiricism". I don't know exactly what that means, but whatever its name, I do feel that this marks the end of these changing phases of development and that the beginnings have been reached of a true reflection in Art and Design of our own age.

I believe, too, that our own designers are not in any way behindhand. There was no work I saw in Sweden which I have not seen equalled or bettered in this country. But theirs is on print, or weave, or lino block; with us, so often only on paper. We must await the slow awakening of public taste and social achievement.

SCANDINAVIAN FURNITURE

By LESLIE MORTON, *winner of travelling studentship, 1946, in furniture group*

You will probably remember two exhibitions held in London about a year ago: one in the Building Centre called "A Modern Swedish Home"; the other at the R.I.B.A. called "Danish Domestic Design". These exhibitions gave me my

first opportunity of seeing actual examples of Swedish and Danish furniture, and though I would probably have travelled in these two countries anyway during last summer, they made it important for me to do so. For here was furniture of *real* interest, whose appeal had nothing to do with novelty and fashion but was, one felt, a product of good design and skilful manufacture and craftsmanship. And I had seen little of this—contemporary work anyway.

I went with a two-fold purpose: firstly to look at furniture, see its manufacture and meet designers and craftsmen; and secondly, to try to discover some of the more immediate factors which contribute to these high standards.

Scandinavian furniture is characterised by its lightness and elegance—a lightness and elegance though which is not over-refined, which possesses the life and vitality of traditional craftsmanship and which is rational and practical.

Most Scandinavian homes are small—in Denmark for instance 65 per cent. of



FIG. 9.—*A chair by Peder Moos
whose work is away from the
general traditional style*

the town-dwellers live in small two- or three-roomed flats—and this has made it necessary to produce furniture which requires the minimum of space. There is just no place for the ponderous and pompous “decorative” furniture. The purpose of every article must be carefully considered and comfort and usefulness achieved with minimum sizes. Both Danish and Swedish designers have looked to our own eighteenth century furniture as their main source of inspiration and, with careful and painstaking research and a sensitive appreciation of the requirements of to-day, have produced both functional and elegant modern furniture. The slimmest possible sections are used for legs and chair backs and rails, yet fine construction gives them more than adequate strength. Great use is made of the beauty of the wood itself and most furniture is made from light coloured timbers left in their natural colours, or but lightly stained down. Cuba mahogany and teak are very popular and these too are clear finished in the natural colour.

I was impressed with this great care which is taken in the finishing processes. A considerable amount of time is given to sanding down to give a form beautiful to the touch and of fine surface, and, after spraying, to rubbing down to a sympathetic finish. This care in finishing is the hall-mark of Scandinavian work.

The standard of hand-made furniture is, of course, excellent and it was a delight to see the work of these fine craftsmen. Usually they work to the designs of architects or furniture designers and are pleased to tell you that "this piece of work is the design of so-and-so"—a happy state of affairs it seemed to me. This combination of craftsmanship and sensitive design produces work of the highest quality. Unfortunately, it is expensive too.

There is a considerable volume of factory production and several factories produce extremely well-made and well-designed furniture. Much of it is traditional in character but there is much development in the use of

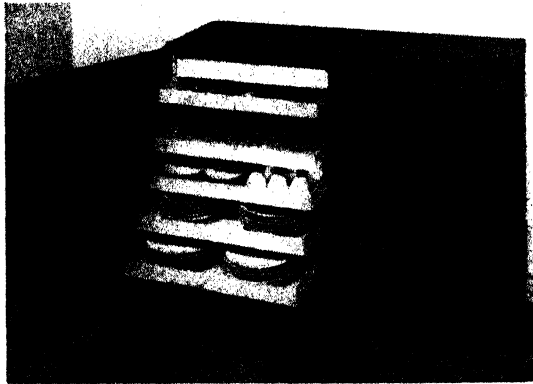


FIG. 10.—A sideboard of acid-stained pine, part of a series of unit-furniture designed by Børge Mogensen for the Danish Co-operative

new materials and new methods. Much work is being done on "unit-furniture". Furniture is manufactured in a series of component-units—cupboard unit, wardrobe unit, drawer unit, table frame, stool frame, feet and so on—whose sizes are such that they will fit together in innumerable different arrangements. Naturally a very high standard of accuracy is required in the manufacture. Using these units one can build up for oneself a scheme of furnishing to suit one's own particular needs, and make changes and additions as the need changes.

A further development is "packet-furniture" or "knock-down furniture". Nordiska Kompaniet in Stockholm have done a lot of work in this field and in their "Triva" series have a range of furniture which can be taken to pieces, packed in cartons for storage and transport, and then simply screwed together by the buyer. In Denmark a group of manufacturers produce "Portex" furniture—packet furniture mainly intended for export. By these means great saving can be made in storage and transport costs and so excellent furniture can be sold at a most economical price.

There are, of course, many deep and fundamental factors which influence,

and have produced, the excellence of design we find in Scandinavia, but there are more immediate and obvious ones. One of the most important is the opportunity of really good training for furniture designers. In the Architectural School of the Academy of Fine Arts in Copenhagen there is a department of furniture under Professor Klint. In Stockholm, Professor Malmsten has his own school which he runs together with his furniture firm. In the School of Arts and Crafts here, too, there is a furniture department providing a complete course in design and practical training, with a fully-equipped workshop, and under the direction of a practising architect and designer, Carl Aking. At the Sloyd foreningen skola in Gothenburg, Director Huldt has a similar course.

The work of Professor Klint and Professor Malmsten has had considerable influence and I feel needs special mention. They have worked continuously for rational and sensitive design based on good tradition, and now, on this foundation,



FIG. 11.—*A group of furniture manufactured by Fritz Hansen of Copenhagen and shown in the exhibition "Danish Domestic Design"*

their students, like Borge Mogensen at the Danish Co-operative and Elias Svedberg at Nordiska Kompaniet, are producing excellent work.

The work of the Arts and Crafts Societies in both countries in the furtherance of good design and the improvement of public taste is invaluable. They arrange exhibitions of furniture and interiors and all kinds of domestic design; run courses and study groups for consumers; organise competitions for architects and designers, and help in the work of training designers and craftsmen. They are live and positive organisations and their effect is considerable.

Full use is made of exhibitions. You have already heard of "Den Permanente" in Copenhagen. In Stockholm too there is a permanent exhibition where craftsmen and designers can show their work under excellent conditions. Every year an exhibition of furniture is held at the Danish Industrial Fair and the cabinet makers have their own annual exhibition of hand-made furniture in the Industrial Art Museum in Copenhagen.

Lastly, though by no means least, is the enlightened outlook of such large

organisations as Nordiska Kompaniet and the Co-operatives of both countries in sponsoring and developing well made furniture of good design at an economical price.

In conclusion to this afternoon's talks I would like to summarise some of the points which have been made about Scandinavian design.

First is the remarkably high standard of public taste and well developed social consciousness and civic mindedness. Miss Ronder spoke of this—of neon signs and public parks and so on—and we have been shown examples of advertising, done in a restrained and dignified way and very pleasing. The shops exhibit their wares in delightful surroundings. People seem to demand these things. The cause, I suppose, lies in the enlightened attitude of the firms and the work of the arts and crafts societies in furthering these ideas of good design.

Second is the love of the open air and the natural life—the love of plant life. They seem to have avoided the sordidness of our own industrial revolution and kept much more in touch with natural things.

Third is the love of their native land and its arts. There is a close connection with native craftsmanship which is still vital and strong and, sponsored by various societies, functions on its own, and, in addition, provides a very strong source of inspiration for designers.

These three things seem to be the main points underlying design in Scandinavia.

THE CHAIRMAN: I feel that I should like to put on record both our thanks and our congratulations to these young artists for the very interesting way in which they have given an account of what they have seen and learned in their travels to Scandinavia. Their approaches have been very different, but we can gather that they have all benefited from and taken great advantage of this opportunity, and that their ideas have been generally widened thereby. I should also like to say that I think it was a very good idea on the part of this Society to ask the prize-winners to come and give us an account of their deeds. It is probable that we have with us this afternoon some of the traders or manufacturers and other people who have generously contributed towards these bursaries and I think that both they, and this Society, can feel that their efforts in working out this scheme and putting up the funds have been justified by the results.

I think everybody realises that trade is going to be difficult in the future, perhaps more so than in the past, and British trade will depend upon good design and workmanship, beyond merely producing the goods; I think we can all be encouraged to know that we are building up a group of designers to that end. I only hope that the manufacturers, the public and everyone else will realise the importance of the artist and the place which he must take in our factories and in our manufactures if we are to reach the kind of standard which has apparently been reached in Sweden. One of our speakers has suggested that we have talent in this country as great as there is to be found in Sweden and I think that is true. She suggests that here the artist's designs are apt to remain more on paper than they would do in Sweden. I hope that manufacturers will realise that they must give the artist status and authority in their factories if they are going to get real quality and beauty into the wares of the future.

Perhaps you will allow me to express your wishes and thank the four readers of the papers very much for the interesting accounts they have given us to-day.

The vote of thanks was carried with acclamation and, after a vote of thanks had been accorded the Chairman, the meeting then terminated.

GENERAL NOTES

BOOK DESIGN EXHIBITION.—An exhibition of a hundred British books, selected as the choicest productions printed in 1947, has been on view at the National Book League's house at 7 Albemarle Street, Piccadilly. Last year we had an opportunity of comparing the standards of British and Continental productions in a lively International Exhibition; this year we can only observe a general improvement in presswork and the quality of materials used in this country, except perhaps in the matter of good durable binding board. An additional feature of interest is a large number of original drawings displayed with the books in which they are reproduced, Edward Ardizzone being represented in this section by the paste-up of his illustrations for "Three Brothers and a Lady" (Acorn Press) shown side by side with the blockmaker's proofs and the finished coloured reproductions—which actually seem to improve on the original designs. Here also are Osbert Lancaster's superb coloured illustrations for his "Classical Landscape with Figures", drawn with underlying irony and admirably matched by the plates printed in photo-lithography by W. S. Cowell for John Murray, and Rex Whistler's dust-cover design for "Oho!"—not one of his best perhaps, but a reminder of the enchanting decorator the world of literature has lost. Among the illustrated books one would single out Hanslip Fletcher's "Bombed London" (Cassell) for the fine quality of the line and coloured reproductions and the unusual binding experiment, and Derek Hudson's "Charles Keene" (Pleiades) for the excellent printing of plates and text, though the line is perhaps a trifle long for comfortable reading, as Mr. Reynolds Stone remarks. General literature is well represented, notably by such examples of unexceptionable presswork as R. A. L. Smith's "Collected Papers" (Longmans) printed by Robert MacLehose in Aldine Bembo—the type most favoured by the judges this year—and Jacqueline Tyrwhitt's "Patrick Geddes in India", published and printed by Lund, Humphries in Perpetua, the noblest of all founts to my mind.

Nine hundred books were submitted, and it is evident that their merits were most carefully weighed by the judges before the short list was made. All the same, it is a little disappointing to find Cambridge scoring another easy victory over their traditional rival, ten titles having been chosen from the list of the Cambridge Press, and (surprisingly) none at all from the impressive catalogue of the Oxford Press. But even Oxonians would no doubt agree that the fourth exhibition of British Book Design worthily continues the line of its predecessors.

N. A. D. WALLIS.

GOLDSMITHS' HALL LECTURES.—Starting on April 22nd, a series of four lectures concerned with the survival of the crafts, with special reference to silver and jewellery, have been announced by the Wardens of the Worshipful Company of Goldsmiths. These lectures are designed for instructors, students and members of the manufacturing and retail trade, and they will be illustrated by lantern slides, photographs and exhibits.

Tickets are obtainable from the Clerk to the Goldsmiths' Company, Goldsmiths' Hall, Foster Lane, E.C.2.

The lectures arranged are as follows:

THURSDAY, APRIL 22ND, 1948, at 6.30 p.m.—"THE CHURCH—ITS INFLUENCE ON THE CRAFTS WITH SPECIAL REFERENCE TO PRECIOUS METALS". Chairman: The Very Reverend The Dean of Westminster, D.D. Speakers: Edward Maufe, R.A., F.R.I.B.A., and others.

TUESDAY, MAY 25TH, 1948, at 6.30 p.m.—"BOOK ENGRAVERS AND METAL ENGRAVERS". Chairman: Philip James, Arts Council of Great Britain. Speakers: Lynton Lamb, G. T. Friend, and others.

TUESDAY, JUNE 15TH, 1948, at 6.30 p.m.—"CHANGING FASHIONS—INTERDEPENDENCE OF THE CRAFTS". Chairman: Howard Robertson, M.C., F.R.I.B.A., S.A.D.G. Speakers: James Laver and others.

TUESDAY, JULY 6TH, 1948, at 6.30 p.m.—"THE CRAFT CENTRE". Chairman: Gordon Russell, C.B.E., M.C., R.D.I., Council of Industrial Design. Speakers: John Farleigh, R.E. R.B.A., and others.

A NEW METHOD OF MOULDING.—The foundation of success in casting rests in the use of first quality moulds. In this connection it is interesting to note that a commercial firm, Vinyl Products, Ltd., of Carshalton, Surrey, have developed a new flexible plastic which may have a revolutionary effect on methods of moulding, particularly in casting concrete, plaster of paris and resin, where constant repetition is required.

The plastic used melts at a low temperature, is heat- and acid-resisting, waterproof and non-shrinking. Because of these qualities, moulds made with it have many advantages over elaborate piece and box moulds and over gelatine moulds as used hitherto. Furthermore the elasticity of the plastic permits the use of one piece moulds even with fairly complicated casts, thus eliminating undercuts.

Those, who have experienced the various disadvantages of gelatine moulds, will confirm that usually no more than six concrete or twenty plaster castings can be made in the same mould, because of loss of its shape and elasticity and because of shrinkage, and there is also the difficulty of the cast burning on to the mould. With the new plastic, however, there is no necessity even for the greasing of the mould, and hundreds of reproductions can be obtained from one mould. Lastly, the mould can be melted down when finished with and the plastic can be remoulded and used again and again.

The same mould material may be used to produce an excellent imitation of a delicate Chinese Jade ornament in a cast resin of a lightly tinted semi-transparent sapphire shade or alternatively for making a complete cast concrete unit for a prefabricated house.

NOTES ON BOOKS

BREATHING IN IRRESPIRABLE ATMOSPHERES. By Sir Robert H. Davis. The Saint Catherine Press. 1947. 25s.

In King Henry VI, Part II, Shakespeare tells how King Henry fell into a swoon, with the words "And now my sight fails, and my brain is giddy" upon his lips. The Earl of Warwick was among those present, and his advice for dealing with the royal casualty was "Give him air, he'll straight be well". This was excellent counsel, but as C. E. M. Joad would say, "it all depends," not only on what you mean by "air", but also on how you give it. Sir Robert Davis elaborates this theme in his fascinating book, and explains, in language which the ordinary reader may follow, the mechanism and purpose of respiration, ways in which the inspired air may become "irrespirable", and the appropriate counter-measures. It must be remembered that in the development of these measures the author has played a pioneer part, and has personally designed many of the breathing appliances which have been and are still used in industry and in war; his account is therefore authoritative.

Sir Robert describes three main ways in which air may become unsuitable for breathing: the oxygen-content may fall too low; poisonous gases may be present; irritating particles may be introduced. It is clear, therefore, that in the design of respirators each of these possibilities must be borne in mind, and in his historical chapters Sir Robert traces the evolution of appliances which will afford complete protection against any known irrespirable atmosphere.

A fall in the oxygen content of the air occurs in confined and overcrowded places, at high altitudes, in ill-ventilated mines or sewers, or wherever fresh air is displaced by an outpouring of some other gas. Whatever the cause, oxygen-lack in the inspired air is followed by a deficiency of oxygen in the circulating blood—so-called anoxæmia. The symptoms of this condition develop without warning, and range from mental confusion and muscular weakness, to unconsciousness and death; the administration of oxygen brings about rapid recovery unless the deprivation of fresh air has been too severe or prolonged. Many of the early balloonists lost their lives from anoxæmia, and the tragic story of Croce-Spinelli and Sivel has been told by their surviving companion Tissandier with such graphic detail that his account has become a classic. Sir Robert gives lengthy extracts, of which the following is typical:

"The body and mind weaken little by little, gradually and imperceptibly, without one being aware of it. There is no suffering of any kind; on the contrary you feel

an inward gladness, and a sort of effect of the radiance of light in which you are flooded. You become indifferent—giddiness appears at the last moment; it immediately precedes prostration, sudden, unexpected and irresistible”.

As Sir Robert remarks, “No courage is proof against oxygen-want, and there is no use in brave men throwing away their lives”.

Early attempts to overcome the deficiency included long breathing-tubes leading away into the fresh air, flexible air bags strapped to the back, cylinders of compressed air, and more recently cylinders of highly compressed oxygen. In the modern types of apparatus, oxygen is supplied through a sensitive lung-controlled regulator which responds automatically to the wearer's respiratory demands, excess carbon dioxide being removed from the circuit by absorption.

Where the respiratory hazard arises from toxic gases or vapours, a filter-box packed with absorbent granules is necessary, and filter-boxes effective against practically every known gas are available for use in emergency (e.g., at chemical works). It is interesting to recall that when poison gas was first used in April, 1915, the only British gas-masks in existence were those designed by Davis and Fleuss, and it was to Davis that the authorities turned for advice. The respirators distributed during World War II (but fortunately never needed) were made to the same basic design, and included filters effective against particulate smokes as well as against vapours.

The reader who is stimulated to consult the book for himself will find a wealth of excellent illustrations, a mass of useful technical data, and innumerable charming historical allusions.

A. G. HOUNSLOW.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING PORTNIGHT

MONDAY, APRIL 20. Electrical Engineers, Institution of W.C.2. 5.30 p.m. F. Baxendale, “Industrial Applications of Photo-Electric Cells.”

Geographical Society, Royal, S.W.7. 5.30 p.m. Dr. Edward Lynum, “English Surveyors and Map-makers, 1555-1611.”

TUESDAY, APRIL 27. Bibliography, British Society for International, at the Institution of Electrical Engineers, W.C.2. 2.30 p.m. (1) J. C. W. de la Bere and Miss M. Dyke, “Library Liaison Officers.” (2) James Berry, “The Information Service of the Engineer in Chief's Library of the Post Office Research Station.”

Electrical Engineers, Institution of, at the Technical College, Cambridge. 6 p.m. H. G. Booker, “Tropospheric Propagation.”

At the James Watt Memorial Institute, Birmingham. 7 p.m. Sir Edward Appleton, “Investigation and Forecasting of Ionospheric Conditions.” At the Engineers' Club, Manchester. 6 p.m. C. J. Armstrong, “Behaviour of High-Voltage Solid-Type Cable Accessories in Service.”

Photographic Society, Royal, S.W.7. 7 p.m. G. B. Harrison, “Problems Relating to the Exposure of Colour Film.”

Refrigeration, Institute of, at the Institution of Mechanical Engineers, S.W.1. 5.30 p.m. (1) R. L. Quertier, “Compressor Valve Design.” (2) E. G. Rowledge, “Valves for Refrigeration Compression Machinery.”

WEDNESDAY, APRIL 28. Foundrymen, Institute of British, at the Waldorf Hotel, W.C.2. 7.30 p.m. F. E. Tibbenham, “Foundries in the U.S.A.” Microscopical Society, Royal, W.C.1. 6 p.m. Dr. F. Smithson, “Microscopy of Ceramic and Raw Materials.”

THURSDAY, APRIL 29. Electrical Engineers, Institution of W.C.2. 5.30 p.m. R. B. Giles, “The Economical Utilization of Electricity in Great Britain.”

FRIDAY, APRIL 30. Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. W. M. Bond, “The Hallade Track Recorder.”

Mechanical Engineers, Institution of, S.W.1. 5.30 p.m. “Atomic Physics” (film).

Petroleum, Institution of, at the Royal Society of Arts, W.C.2. 4.30 p.m. Andrew Agnew, “The U.K. Petroleum Industry in War.”

Royal Institution, W.1. 9 p.m. Sir Harold Spencer Jones, “The Age of the Universe.”

TUESDAY, MAY 4. Central Asian Society, Royal, at the Royal Society of Arts, W.C.2. 5.30 p.m. Sir Charles Lockhart, “Economic Developments of East Africa.”

Kinematograph Society, British, at the Manchester Geographical Society. 10.30 a.m. C. H. Bell, “Planning the Projection Room.”

At the Neville Hall, Newcastle-on-Tyne. 10.30 a.m. R. Robertson, “Projection Equipment.”

WEDNESDAY, MAY 5. Electrical Engineers, Institution of W.C.2. 5.30 p.m. (1) J. A. Smale, “Some Developments in Communication Point-to-Point Radiotelegraphy.” (2) R. Ruddlesden, E. Forster and Z. Jelonek, “Carrier Frequency Shift Telegraphy.” Interplanetary Society, British, 107 Charing Cross Road, W.C.2. 6.30 p.m. H. P. Wilkins, “Lunar Research.”

Iron and Steel Institute, at the Royal Institution of Chartered Surveyors, 12 Great George Street, S.W.1. 11.30 a.m. (1) D. C. Muir, “Construction and Repair of Open-Hearth Furnaces.” (2) M. P. Newby, “The Design of Open-Hearth Gas Ports.” (3) R. C. Baker, “Installation and Use of Instruments on Open-Hearth Melting Furnaces.”

2.30 p.m. (1) H. Morrogh and W. J. Williams, “The Production of Nodular Graphite Structures in Cast Irons.” (2) D. Marles, “The Carbides in Iron-Carbon-Silicon Alloys and Cast Irons.” 3.45 p.m. J. Glen, “Abnormal Creep in Carbon Steels.”

8.30 p.m. Professor Robert F. Mehl, “The Decomposition of Austenite by Nucleation and Growth Processes.”

THURSDAY, MAY 6. Iron and Steel Institute, at the Royal Institution of Chartered Surveyors, 12 Great George Street, S.W.1. 9.30 a.m. (1) J. H. Whiteley, “A Micro-Examination of Eight Steels for the Inclusions Sub-Committee.” (2) W. Betteridge and R. S. Sharpe, “The Study of Segregations and Inclusions in Steel by Micro-Radiography.” (3) E. C. Rollason, “Some Thermodynamical Aspects of the Formation of Inclusions in Mild-Steel Weld Metal.” 10.45 a.m. (1) W. L. Kettle, “A Comparison of Moulds of Standard Composition and of Approximately Ingot Mould Sub-Committee Composition.” (2) N. H. Bacon, “Mould-Weight Ingot-Weight Ratios and Its Relations to Mould Consumption.” (3) P. Walker, “Formation of ‘Double Skin’ or ‘Curtaining’ on Top-Poured Mild-Steel Ingots.”

FRIDAY, MAY 7. Engineering Draughtsmen and Designers, Institution of, at the Royal Society of Arts, W.C.2. 7 p.m. (1) W. Ivey, “Timber.” (2) R. K. Osborne, “Aluminium Alloys.” Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. W. A. Tooke, “Technical Evidence—Some Reminiscences.”

Royal Institution, W.1. 9 p.m. Edward Crankshaw, “Life in Russia To-day.”

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No. 4768

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:—

TUESDAY, MAY 11TH, at 2.30 p.m. (Dominions and Colonies Section).—“CONTROL OF INSECT-BORNE DISEASES IN THE COLONIES; SOME RECENT PROGRESS AND FUTURE PROSPECTS”, by C. B. Symes, O.B.E. J. L. Simonsen, D.Sc., F.R.S., Director of Research, Colonial Products Research Council, will preside. The Paper will be illustrated by lantern slides.

WEDNESDAY, MAY 12TH, at 2.30 p.m.—Craftsmanship.—(viii) “CRAFTSMANSHIP IN THE COUNTRYSIDE”, by Cosmo Clarke, M.C., Director of the Rural Industries Bureau. The Right Hon. Lord Cranworth, K.G., M.C., will preside. The Paper will be illustrated by lantern slides.

THOMAS GRAY MEMORIAL TRUST

The following announcement is made concerning the offer of prizes under the Thomas Gray Memorial Trust. In 1947 the Council, under the Trust, offered a prize of £50 for an invention which was considered to be an advancement of the science and practice of navigation and an award of £50 for a deed of outstanding professional merit on the part of any member of the British Merchant Navy. There were six entries for the former award and two for the latter. In neither case, however, were the judges appointed by the Society able to recommend an award.

PROGRAMME OF MEETINGS FOR THE 195th SESSION

The Council will proceed in June to consider the programme for the forthcoming 195th Session. Any suggestions from Fellows as to subjects for papers or lectures, will be welcomed and should be addressed to the Secretary.

RECONSTRUCTION IN MALAYA

By A. T. NEWBOULT, C.M.G., M.C., E.D.,
Chief Secretary, Malayan Union

Dominions and Colonies Section, Tuesday, January 20th, 1948

SIR FRANK STOCKDALE, G.C.M.G., C.B.E., *Adviser on Development Planning at the Colonel's Office, in the Chair*

THE CHAIRMAN: This afternoon we have a paper on reconstruction in Malaya. This paper was prepared by Mr. A. T. Newbould, who is the Chief Secretary of the Malayan Union, and it will be read to us by Mr. N. R. Jarrett, who is the Secretary of the Association of British Malaya.

Mr. Jarrett has had long service in the Malayan civil service, and he now occupies

the position of Secretary to the Association of Malaya in London. I am sure that we all look forward to this account of Mr. Newbould on reconstruction in Malaya. There have been many difficulties and this paper will give us some account of how those difficulties have been faced and what progress has been made.

I will now call upon Mr. Jarrett to read the Paper.

The following Paper was then read :

It gives me great pleasure to present to you to-day this paper on Reconstruction in Malaya, because it provides an opportunity to describe a work which has not been widely known but nevertheless represents, in this difficult period after the war, an achievement of much credit. Of all the countries which were embraced in the war in the Far East, and of all those which suffered so severely during the Japanese occupation, Malaya has made a better start than any of her more unfortunate neighbours. There are several reasons for this: she did not suffer the material damage inflicted during the campaigns in Burma or Borneo; during the occupation, plans for her reconstruction were prepared in England at an early date, which have paid good dividends though they have not by any means been implemented as originally intended. The Japanese themselves, through their harsh government during the period of their occupation, made more easy the path for our return by ensuring a welcome which was genuine and thrilling to both those of us who were in the vanguard of our return and to returning civilians, official and unofficial, who had spent three and a half years as prisoners of the Japanese. But the main reason, in my opinion, for this good start is the natural resilience of a young and active country, slowly awakening to its own powers and its own future.

When war in Europe broke out, Malaya's exertions were principally directed to the maximum production of rubber and tin. She became the dollar arsenal of the Empire and the use of her man-power was mainly directed to these two industries. It is true that her defence services were increased, but this was very largely by the arrival of men from elsewhere. At a time when the British Empire stood alone in her fight against the oppressors, the outposts were of necessity thinly manned and unable to withstand the treacherous onslaught of a powerful military nation. When the Japanese made their brutal attack on Pearl Harbour, enemy forces had already landed on the Malay Peninsula and had raided our airfields. The unselfish and heroic efforts of the people of Malaya in the Volunteer Forces, the Local Defence Corps, the Passive Defence Services, which included air-raid wardens, medical auxiliary services, auxiliary fire services, blood transfusion groups and the host of similar civilian-manned services were of no avail in the military disaster which engulfed the country. With the passage of time it is to be hoped that the early bitter and inaccurate recriminations will be forgotten and that the bravery, endurance and courage of men and women who fought for ten nerve-racking weeks will be given their due meed of praise. The landslide of the campaign left the people of the country stunned. In a short period of time they had to readjust themselves to a victorious army with ambitions far wider than Malaya itself. The initial savagery of the Japanese régime created widespread fear as it was undoubtedly designed to do with the object of securing "co-operation". The calculated change in Japanese tactics which took place after some months, and aimed at enlisting civilian support by giving Malaysians seats on puppet councils, was as

ephemeral as it was insincere. As the war progressed and the apparently victorious nation was gradually checked, the attitude of the Japanese to the people of Malaya hardened and in the final period, when the writing was on the wall, the local population felt the full force of Japanese tyranny and incompetence. In such circumstances the happy picture of pre-war days was smashed. Inter-racial hatred was fostered by the Japanese. Moral standards vanished, and we were left with the fragments to try to piece them together into the picture for the future.

In trying to give you this reconstructed picture, I will take the constitutional issues first. I do so for two reasons: firstly, they are the most important and far reaching; secondly, they are fundamental. In order to make the new picture intelligible it is necessary to describe shortly the position as it existed before the war. Then the territories which make up Malaya were divided into three groups:

Firstly, the Colony of the Straits Settlements, consisting of the Settlements of Singapore, Penang and Malacca;

Secondly, the Federated Malay States of Perak, Selangor, Negri Sembilan and Pahang; and

Thirdly, the Unfederated Malay States of Johore, Kedah, Kelantan, Trengganu and Perlis.

The Straits Settlements were a Crown Colony of the usual pattern under direct British rule with a Governor and Executive and Legislative Councils.

In the Federated Malay States there were separate agreements between the British Government and the individual rulers under which the ruler accepted a British official, whose advice on all matters of general administration, except matters relating to the Muslim religion and Malay custom, the ruler was bound to accept. In 1895, these four states agreed to federate. In 1909, a further agreement established a Federal Council which was enlarged in size in 1927 to make it more representative.

The five unfederated states had separate agreements by which they agreed to accept a British adviser who could advise on all matters of general administration, except those affecting the Muslim religion and Malay custom. In these states the functions of the adviser followed a strict interpretation of the agreement, whereas in the other Malay States, the Resident, as he was there called, had from the early days, out of necessity, assumed administrative control. When the agreements were made with the Unfederated Malay States there was in existence in each state the machinery of government, which was absent in the days when the first agreements with the four Federated States were made.

The single co-ordinating authority in these three groups was the Governor of the Straits Settlements and High Commissioner for the Malay States. In the colony he had all the powers of a Colonial Governor. In the Malay States he exercised his authority through the Resident or Adviser and, in Federal matters in the Federated Malay States, through the Federal Secretary. I have said enough to show how cumbersome and complex the machinery was, and it had, for some time, been felt that a greater degree of co-ordination was required in the government of a country the size of Malaya with a population of five and a half million people before the war. The British Government considered that our return to Malaya constituted a suitable opportunity to effect these necessary changes and in the Autumn of 1945 it announced its proposals. These can be stated shortly, as the integration of the many separate

political units within a single territory to be known as the Malayan Union, with the important reservation that Singapore, in view of its economic and social interests distinct from those of the mainland, should for the time being remain a separate government. A further and essential part of the new scheme was the creation of a common form of citizenship for all those who regard Malaya as their real home and the object of their loyalty.

As the first step towards implementing this policy, Sir Harold MacMichael was appointed Special Representative of His Majesty's Government and concluded fresh agreements with each of the rulers under which full power and jurisdiction were conferred on His Majesty. With these powers the Malayan Union was set up



FIG. 1.—Interior of wrecked carriage shops, Malayan Railways, Kuala Lumpur, with ruined coach crushed beneath a girder—the result of Allied bombing

by Order in Council. The Order in Council to create a Malayan Union citizenship was deferred in order to give opportunity for local discussions. The Colony of Singapore was established by a separate Order in Council.

The creation of the Malayan Union brought objections from Malays in all parts of the country and opposition grew steadily. The grounds were not so much a dislike of the proposal for some form of closer integration as the manner in which the scheme had been presented, and the loss of the rights, prerogatives and powers of the rulers, inherent in the Malayan Union proposals. The opposition was firm: it took the form of the rulers abstaining from the inaugural ceremony of the swearing-in of the new Governor and any participation in the work of councils established by the Malayan Union Order in Council by Malays. The position was a deadlock.

As a result of discussions in Malaya, certain proposals from the Malays were put forward to the Government and it was agreed that details of a scheme should be worked

out by a joint committee representing the Government, the rulers and the United Malays National Organisation, formed in 1946, which were acceptable to Malay views, and subscribed to the principles laid down by the Government allowing for the progressive constitutional development of the country as a whole, with a strong central government and a common form of citizenship for all those who had made Malaya their real home and the object of their loyalty. Up to this stage the differences lay between the Government and the Malays and it was necessary to resolve these as a preliminary step. The report of the committee embodied a draft Federation Agreement and model State Agreements which would establish a Federation, instead of a Union, with powers clearly defined. These proposals were conditionally approved by

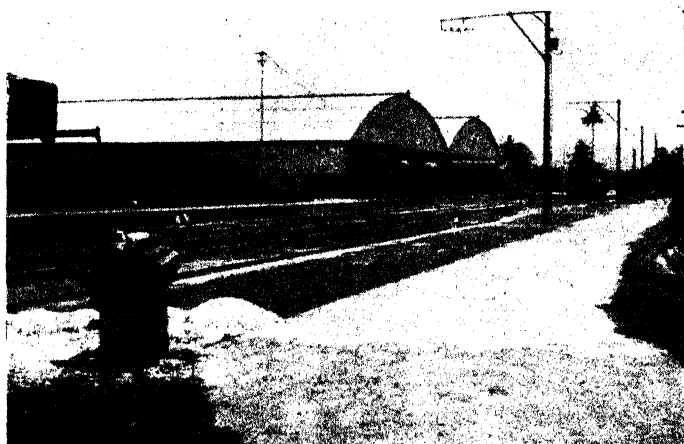


FIG. 2.—Completed reconstructed carriage shops, Kuala Lumpur, replacing those destroyed by Allied bombing—September, 1947

the Government subject to no final decision being taken until all interested communities in Malaya had been given a full and free opportunity of expressing their views. For this purpose a special committee was set up. The committee held six public sessions and received some eighty-one written representations, and, as a result of its report, some modifications were made in the draft agreements, with the agreement of the Malay representatives. The most important amendment was the increase of the Federal Legislative Council with a different distribution of seats. A few modifications of the citizenship proposals were accepted. The scheme as drawn up in the draft agreements and modified later as a result of consultation with other interested communities has been agreed to by the Malays and approved by His Majesty's Government. It is hoped to bring the Federation into existence shortly.

Before giving a short review of the proposals, the position of Singapore should be made clear. In the original proposals, governments were established for both Singapore and the remainder of Malaya, in view of the separate treatment required. Singapore is a centre of entrepôt trade on a large scale and consequently has economic

and social interests distinct from those of the mainland. This decision has met with considerable criticism, but in trying to appreciate the position we must bear in mind the size and importance of Singapore, the predominantly Chinese majority of its population with problems and outlook of its own, and the need to integrate the political units of Malaya which were far more akin to each other than Singapore was. Whilst the future of Singapore is to a large extent bound up economically with the rest of Malaya, it was considered that the other territories would have a better chance of political development if Singapore was, at the outset, a separate administrative unit. It was, of course, recognised that there would be problems of common interest and, to meet these, special measures have been taken to co-ordinate policy and action in such fields as far as is possible. The future of Singapore is a matter for discussion, but emphasis must be laid on the fact that the door for her inclusion in the Federation remains open. It is for the two governments, when they have been established, to consider this important problem. At the moment the colony of Singapore is established by Order in Council on the usual pattern, and this year she is to have a partly elected legislative council, consisting of nine official and thirteen unofficial members, of whom four are nominated by the Governor, three by the Chambers of Commerce and the remainder (six) elected. The unofficials will have a clear majority of four seats and this marks a considerable advance from the pre-war legislative assembly of the colony.

The main features of the new Federation of Malaya Constitution are to be found in the Federation Agreement to be made between His Majesty and the rulers of the Malay States. There will also be an Order in Council providing for the Government of the Settlements of Penang and Malacca which remain British territories, and to give legal force to the Federation Agreement. New state agreements will also be made individually with each ruler to provide that, subject to the provisions of the state and federation agreements, the rulers shall enjoy the prerogatives, powers and jurisdiction which they enjoyed prior to the Japanese occupation, and that the government in the state shall be subject to the provisions of written constitutions.

Certain general provisions are of importance:

1. The complete control of the defence and of all the external affairs of the federation are vested in His Majesty.
2. Power is reserved to His Majesty and the rulers by agreement to admit any other territory within the federation.
3. The Federation Agreement has a recital to the effect that it is the desire of His Majesty and the rulers that progress shall be made towards eventual self-government and that, as a first step, legislation shall be introduced for the election of members to the various legislatures as soon as circumstances and local conditions permit.
4. The majority of the provisions of the Federation Agreement may, from time to time, be amended by legislation in the Federal Legislative Council after obtaining the prior approval of His Majesty and the rulers. A few clauses have a special procedure where amendment is more appropriately made by the High Commissioner in terms previously agreed upon by His Majesty and the rulers.

The Central Government of the Federation comprises a High Commissioner

appointed by the King with a Federal Executive Council and a Federal Legislative Council with a large unofficial majority. The powers of the Federal Legislative Council are expressed in a schedule. Power has been given to the Federal Legislative Council to pass uniform laws on matters of common interest, *e.g.*, land, leaving the executive authority in the hands of the State or Settlement Government. The power to legislate for any question not included in the schedule lies with the State or Settlement Government. The schedule may be amended from time to time by proclamation issued by the High Commissioner in terms previously agreed upon by His Majesty and the rulers.

Bills require the assent of the High Commissioner and of the rulers expressed by a standing committee of two rulers on behalf of all of them. The High Commissioner

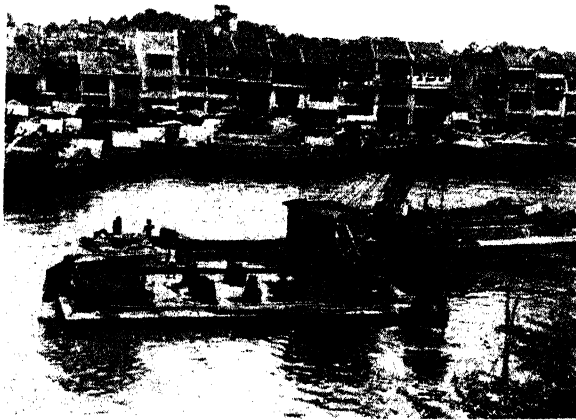


FIG. 3.—*Dredging of Singapore River for inland communications has been resumed*

is vested with certain reserved powers in the interests of public order, public faith or good government to give effect to legislation, where he may think it reasonable and expedient, though it may not have been passed by the Legislative Council.

The Executive Authority of the Federation extends to matters in respect of which the Federal Legislative Council has powers to pass laws, except in cases where such executive authority is delegated to the State or Settlement Government. The composition of the Federal Legislative Council is three ex-officio members, eleven official members, nine Presidents of Councils of State, and one representative of the two Settlement Councils to be selected by the members of the council, and fifty unofficial members, a total of seventy-five. The unofficial members will be nominated to represent interests, groups and activities, such as labour, mining, rubber, agriculture, commerce, professional, educational and cultural.

A Conference of Rulers, consisting of all the rulers of the Malay States, is established under the Federation Agreement. The conference will meet, whenever necessary, under the chairmanship of one of the rulers, and will meet the High Commissioner at least three times a year.

The High Commissioner will explain to the rulers the policy of the Federal

Government on proposed legislation and matters of importance to the Malay States, and will ascertain the views of the rulers. One of the principal problems on which the High Commissioner and the rulers will confer, as occasion arises, will be immigration. In the past, immigrants from overseas, mainly Chinese and Indians, have entered Malaya in increasing numbers, some remaining and becoming true sons of Malaya, others returning after a period of years to the country of their origin. The increase in the number of immigrants has been such that at the 1931 census the non-Malays out-numbered the Malays. No one can deny the great contributions of the non-Malay communities to the wealth and prosperity of pre-war Malaya. The present scheme is designed to include in a common citizenship all those, whether Malays or non-Malays, who regard Malaya as their true home. The Malays, however, are peculiarly the people of the country. They have no other homeland, no other loyalty. They thus have a special and justifiable interest in immigration policy, which it would be inequitable to refuse them. Accordingly, it has been agreed that it shall be the particular duty of the High Commissioner to consult the Conference of Rulers from time to time on the immigration policy of the government, and, in particular, when any major change in such policy is contemplated by the Federal Government.

In each state there will be established a State Executive Council and a Council of State with legislative powers in certain subjects. The State Agreement concluded with the ruler of each state will provide that the ruler undertakes to promulgate, as soon as conveniently may be, a written constitution for his state in conformity with the relevant parts of the Federation Agreement.

Both Penang and Malacca will be included in the federation under the Federation Agreement and they will be administered in conformity with the provisions of the Federation Agreement. There is provision for the constitution of a Settlement Council in each of the settlements.

Schedules attached to the Federation Agreement will define the sources of revenue for the Federation Government, on the one hand, and for the State and Settlement Governments on the other, and the heads of expenditure for which the various authorities will be responsible. It is likely that the expenditure for which the states and settlements will be responsible under this arrangement will exceed their own revenues, and provision is made for block grants from federal revenues which will enable the states and settlements to meet their approved expenditure.

The form of citizenship proposed for the new constitution is designed to draw together with a common loyalty all those who can be said to regard Malaya as their true home. It will not affect or impair the status of British subjects or of the subjects of the rulers in the Malay States. It is intended that citizenship will carry with it rights and duties; thus, federal citizenship will be a qualification for unofficial membership of the Federal Legislative Council and for membership of the Councils of State.

Citizenship will be of two classes, one which will be acquired automatically and the other by application. Each class is divided into several categories, which are defined. The underlying principle is that anybody, who, by local birth or length of residence, meets the qualifications laid down, should be eligible for citizenship. Provision also exists for the loss of federal citizenship in certain circumstances.

Leaving now this interesting constitutional experiment, let us examine other aspects of reconstruction. When the British returned to Malaya in the autumn of 1945 we were faced with many new and difficult problems, many of which are still only partially solved to-day.

We found suspicion and blood feuds between the local communities in place of racial harmony; universal malnutrition with all the consequences which flow from it; complete absence of every article normally imported; thousands of rural families almost naked, restricting school attendance and handicapping agriculture; widespread unemployment; a Japanese currency of four thousand million dollars against a pre-war average circulation of just over two hundred million dollars;



FIG. 4.—*Bailey bridge at Klang, Selangor, replacing the pre-war bridge destroyed during the Allied retreat*

wholesale disintegration of moral standards, and a prevailing state of ignorance or distortion of facts relating to the war only possible in a country where the truth was too dangerous to be published.

Until the return of civil government six months later, we were obliged to tackle these problems without the assistance of the main body of Malayan administrative and technical officers, the majority of whom had been prisoners of the Japanese and were, therefore, urgently in need of recuperative leave. After the inauguration of the Malayan Union much time had to be devoted to the discussion of revised constitutional proposals by a number of senior officers thereby limiting their ability to concentrate on other vital aspects of reconstruction.

Of all the evil legacies of the Japanese, one of those which called for the most urgent and widespread attention was public health. Hospitals had used up the drugs and stores left by us in 1942, where these were not taken by the Japanese for the use of their military forces, and since then they had received practically nothing in the way of new supplies. It was due to the devotion and hard work of the hospital

staffs that hospitals were able to remain open and function at all in the extremely difficult conditions.

Malnutrition left its mark on all sections of the community, but especially on the poor. Not only was the natural resistance of the human body seriously weakened, but its recuperative powers were so reduced as to make treatment of disease far more difficult. Noticeable was the increase in cases of septic ulcers and yaws.

In health matters, control was seriously relaxed by the Japanese authorities. Malaria had always been the scourge of the country, but due to the success of our scientists, the skill of engineers and the expenditure of large sums of money, together with unrelenting care and maintenance, Malaya had so reduced this serious menace that before the war malaria no longer headed the list of fatal diseases. But this stage had only been reached through rigorous routine measures for control which depended for their results on the regularity of their enforcement. In one district the figures of fresh infections speak for themselves: in 1938 it was fifty-seven; in 1939 it fell to twenty, and in 1942, it rose to five hundred and twenty-one. This shows the measure of the task which faced us on our return and speaks eloquently for the control which had been instituted during the years before the war. On re-occupation not only malaria control, but all the multifarious health measures in urban and rural areas had to be re-established, and it is to the credit of the health services that the results have been so successful in avoiding any serious outbreak of disease. Pulmonary tuberculosis, which is the next most serious disease prevalent in Malaya, is more prevalent than before the war, though it is not yet possible to estimate its incidence with any degree of accuracy. This is not an unusual feature in countries which have been ravaged by war, but public interest has been considerably awakened to the importance of tackling this disease effectively and the first steps were taken during 1946 in a realistic campaign for better housing. Overcrowding, which had always been a serious problem in the towns, had been aggravated to a considerable degree during the occupation by the drift of people from rural areas to larger centres of population. But the war against tuberculosis has only just begun and progress will be slow and expensive. However, the most encouraging feature is the wider public appreciation of its causes and a greater public determination to tackle the problem.

In the field of education there is, if possible, a more serious problem to be solved. In addition to the leeway to be made good, there remains to be tackled the general improvement in the standards of, and facilities for, education. For all practical purposes education ceased during the period of occupation, though rural schools did remain open and teaching of a sort was continued. The teaching of English was rigorously suppressed, and teaching of Japanese was added to the syllabus. There was a most serious lack of teaching staff, as teachers of all races were the victims of Japanese attack in their elimination of dangerous elements in the civil population. On our return, we were faced by this gap of four years, the occupation of many school premises for other purposes, the loss of books and furniture, and a vast surging clamour for greater and improved educational facilities from all sections of the community. The problem is vast. The educational plan has been recast, not merely to make good the losses occasioned by the war, but to build up a progressive system of education for boys and girls of both village and town, from vernacular education

to secondary and university education, to fit them for the part they have to play in the future of Malaya. To achieve our aim we will require many more buildings and a vastly increased staff. This will take time to provide and a large expenditure of money at a time when the revenues of the country have so many calls of outstanding importance. Through the Colonial Development and Welfare Fund, grants will be available, but these will only suffice for a part of the total required: the remainder will have to come from local resources. Fortunately for education, as for health, the people are ready to pay what they can for greater facilities, and individual generosity amongst all communities knows no bounds.

Of the other activities of government, such as railways, roads, public works,



FIG. 5.—A prefabricated house at Kuala Lumpur

electrical services, I will not weary you with a detailed account. Progress in each department has been made, varying according to the amount of destruction which took place during the period of enemy occupation and the speed with which supplies were forthcoming. Much detailed planning had been done in London before our return, both for the period of military administration and the initial period after the civil government resumed. This planning paid very good dividends as it enabled supplies to come forward at a very much earlier date than would otherwise have been the case. It was, of course, difficult to plan for conditions which, at the time of planning, could only be guessed; and supplies arrived not necessarily in the order of priority of requirement, but in the order of availability. But from the very beginning regular road and rail services were re-established on an increasing programme; the larger towns had electrical power; postal, telephone and telegraph services were resumed at a very early date and within a few months the country settled down to a semblance of its former life. Although looting had inevitably taken place on a large scale, both during the Japanese invasion and immediately after the Japanese

surrender, Malaya was lucky in that there had been no major military campaign of re-conquest, with all its attendant damage and misery; but it owed its speedy return to normality to the hard and devoted work of all ranks of the community. After the nightmare of Japanese administration it was with zest that the people returned to a way of life to which they were accustomed. True, there were many serious difficulties. It took some time to re-establish any appearance of law and order. The police force had been more demoralised than any other service of government. The Japanese military and secret police had, to a great extent, operated through the former police services to the serious detriment to the morale of that force.

During the early months there were the inevitable charges of collaboration to be sifted, and those against whom there was the evidence were brought to trial in special courts set up for the purpose. A considerable proportion of the male population, and in some cases, women and children, had been displaced by the Japanese (thousands were taken away to do forced labour either in distant parts of Malaya, Borneo or Siam, and many thrown out of work), or had fled to the jungle where they maintained themselves as either regular or irregular guerilla bands. On our return, their occupation was gone, there were large stores of arms and ammunition lying scattered all over the country and the temptation of using robbery and extortion as easier methods of earning a livelihood than labour in the field or office. Compared with conditions in neighbouring countries, Malaya is better off; but she has some way to go before she reaches the peaceful and orderly conditions which existed before the war.

There are two departments of which special mention should be made. Both of them are new, and both of them have direct relationship with the people of the town and village. They are the departments of Public Relations and Social Welfare. One thing which the six years of war have taught us is the necessity for some means of disseminating information to a population only 40 per cent. of which is literate in any language. This is especially true in countries in the Far East where only a small percentage of the population reads newspapers, and where those newspapers are often so politically guided that their news is distorted. Furthermore, during a period such as the re-occupation of a country after three and a half years of enemy rule, there must necessarily be measures of major importance to the public which require explanation and elucidation. To meet these requirements a department of public relations was established during the period of military administration, and continued when the civil government resumed. It is still in the experimental stage, seeing how best it can tackle the vast field of its activities with the limited material available.

Clearly, in a country whose new constitution contains a firm promise of the introduction of electoral machinery in the near future, it is of paramount importance that the problem of educating the adult population in every aspect of government activity and in the part they must play in the future of their country is faced without delay. This work is being tackled in the four languages of Malaya, English, Malay, Chinese and Tamil, by all available means, ranging from the provision of information centres and reading rooms, and the production of booklets, pamphlets and newspapers to the pioneer work in the rural areas undertaken by mobile public address and cinema units.

The work of social welfare before the war was divided between several departments

but on our return it was decided to combine all these activities under one head. Here is necessarily a field for the active co-operation of the people themselves and emphasis has been laid on the co-operation of leaders of the communities in the various activities of the department. A Central Welfare Council for the Malayan Union has been set up consisting entirely of unofficial ladies and gentlemen, whose functions are to advise government on welfare work generally, to administer funds raised for welfare work, and to provide an outlet for unofficial energy and interest. There are also state and settlement welfare councils. Preliminary steps have been



FIG. 6.—A travelling dispensary visits Kampong areas in Negri Sembilan

taken in child delinquency and public education on the dangers of tuberculosis. There are numerous bodies which are devoted to various forms of welfare work which will continue.

The greatest change which affected the vast majority of the people was the serious shortage in the supplies of rice. There is no commodity at home which corresponds in importance to rice to an Eastern people. It is the staple food of everyone save a very small percentage of the population. Before the war it was plentiful and it was cheap. Two-thirds of the rice consumed in Malaya came from abroad, either from Siam or Burma. In spite of the very active steps taken to increase local production, it was not possible to raise the figure above one-third of total consumption. On our return in September, 1945, rice was neither plentiful nor cheap. Owing to disruption of communications with the producing countries, the drop in production in those

countries, and the failure of the attempts of the Japanese to maintain, let alone increase, local production, all contributed to a rice famine in the country, to rocketing prices, and to an active black market. As rice is the staple food of the population it is the yardstick for wages, and, consequently, the economy of the country was seriously upset. In addition, the shortage produced deficiencies in nutrition which seriously affected the health of the people, as the alternatives of tapioca and other root crops proved unpalatable and insufficient to maintain the health of the country. No appreciable progress has been made in changing the habits of a rice-eating country, especially when they thought that the return of the British would automatically mean the resumption of rice supplies in adequate quantities. To help to bridge the gap, wheat was imported in considerable supplies, but even this was reduced in view of the world shortage of wheat. Every effort has been made to popularise wheat, but there are limits to the extent to which any country will, in a matter of two years, change its basic diet.

In actual fact, imports of rice in 1946 were 23 per cent. of requirements, and with local production falling to 20 per cent., the total availabilities were only 43 per cent. of the amount of rice required to maintain the pre-war level of consumption. The rationing of the supplies of rice available has produced more headaches than any other single problem. Consideration must be given to the varying requirements of the community, such as heavy labour whose strength has to be maintained in the general interest. Then there has to be considered the effect of any measure on the production of local rice, and there is the difficulty in an Asiatic country, of purchasing all rice supplies from producers, who have not forgotten the ways of Japanese administrators and their forceful sequestration of any rice on which they could lay their hands without compensation. The question shows little signs of immediate improvement, and Malaya must look forward to a permanent re-adjustment of her economy to adapt it to the changed conditions in the rice world.

The most telling effect of this rice shortage was naturally in the field of wages and cost of living. Here the Government was faced with the difficult problem of trying to equate the reasonable demands of labour with the actual cost of living on a reduced and new standard, while certain sections of the community clamoured with immoderate demands, ignoring the country's inability to pay the price. Ever since our return we have lived from hand to mouth and have had to tackle with determination and vision the problems as they have arisen from day to day. It is clear that there can be no return to the cheap wages of pre-war days: supplies of general consumer goods are improving steadily and they are exercising a stabilising force. But the fundamental problem still remains, a solution of which would have more effect than that of any other, by balancing the forces of costs and wages; that is an increase in the supply of rice at a reasonable price.

As can well be imagined, the effects of the rice shortage on labour generally were serious. There are several factors which played an important part in labour matters on our return, but in the opinion of many best qualified to judge, we would have avoided many of our troubles ending in serious strikes and in some cases in open clashes with authority, had we been able to feed and clothe the labour population in anything like an adequate manner. The restless condition of labour after the war was aggravated by the conditions under which it had lived and worked during the

Japanese occupation. On our return most workers were under-nourished and were not in a physical condition to undertake a full day's heavy work. Workers had lost the habit of regular work and fixed hours and the standards to which they had been accustomed had vanished. Living accommodation had been seriously neglected or damaged and their amenities had gone.

On our re-occupation we found in existence a body which called itself the General Labour Union. This body opened premises in all the larger towns in Malaya, and its aims and objects were largely political. It strove to gain and exercise control in all labour matters, laying down the pattern for others to follow. Just before the Japanese occupation, legislation had been introduced in Singapore and most of the territories now comprised in the Malayan Union, to provide for the registration and supervision of trade unions, but the war intervened before it could be operated. On our return active steps were taken to implement its provisions, a registrar was appointed and an officer with considerable trade union experience in Great Britain, was appointed as trade union adviser. His functions are to advise and assist in the formation and running of unions and, though he works in close touch with the commissioner for Labour and the Registrar of Trade Unions, he is independent of them. He has now two assistants and it is hoped to increase his staff as soon as suitable men can be recruited. To date four hundred and twenty-seven unions have been registered with a total membership of 273,977, while more applications are awaiting approval of rules before registration.

In spite of the many difficulties which have faced it, commerce has emerged from the first two years of occupation with success. Singapore before the war handled a very considerable part of the export and import trade of the Malay Peninsula, but the economy of the island itself is largely dependent on entrepôt trade between the surrounding countries and world markets. The work of rehabilitating the port rapidly progressed and there was a remarkable trade recovery as a result, so that by the end of 1946 the capital value of Singapore's trade exceeded one thousand million dollars. This was a creditable achievement despite an amount of labour trouble and a three-week strike of dock workers in November of that year. The money value of Singapore's 1946 trade was one and a half times that of 1939, but its total quantity was a little less than half of the 1939 figure. The absence of tin smelting facilities in Singapore owing to the destruction of the plant reduced the quantity exported to a small amount.

In the Malay Peninsula it was found that the damage to rubber estates was less than was anticipated, although the labour forces were very sadly depleted as a result of the compulsory transfer of thousands of Indian workers for the construction of the notorious Siamese railway. The male Tamil working population was greatly reduced and in a pitiable state of malnutrition.

The problem was tackled energetically and with the return from recuperative leave of many planters who had been interned by the Japanese, the production of rubber and latex rose rapidly, so that in the half year ending December, 1946, the value of rubber exported reached \$282,032,707 and production by the end of 1946 exceeded the average monthly figure for the record year of 1941.

The tin industry suffered more grievously than did that of rubber owing to the destruction of dredges and all types of machinery at the hands of the retreating

British Army in 1941-42, or their removal by the Japanese or by looters. Delay in obtaining essential machinery has slowed down the rehabilitation of this industry and the quantity of tin produced in 1946 reached only one-tenth of the 1940 production. This industry also had to contend with labour difficulties but its major handicap was the shortage of plant.

I have tried, somewhat imperfectly, to give you a picture of Malaya of to-day: the land of great achievements in the past and great possibilities in the future. Now she stands, after emerging from the fire of Japanese tyranny, with her old traditions of freedom and tolerance still firmly rooted. Whatever trials may face her in the years to come, and they will be many, she will face them with courage and strength.

The many communities which make up Malaya as she is to-day with their divergent cultures, religions and manners of life, must cultivate one common interest in the future welfare of the country, and from our experience in the past and present we are entitled to hope that those whose affection and loyalty lies in Malaya will see that the common welfare is assured. The foundations which have been laid during the last hundred years still survive to support the structure which future generations will build.

DISCUSSION

Mr. W. H. E. NEIL: Mr. Newbould's interesting paper mentions the rice problem in general terms. As the people at home do not seem to know what is happening regarding the rice shortage and as I returned from Malaya as recently as November, it may be of interest to give some details.

Before the war a member of the labouring class would require some six gantangs of rice per month to sustain him. Under the rice control scheme the allowance in November was, if my memory serves me well, one gantang per person per month. A gantang is about $6\frac{1}{2}$ lbs. The type of rice a labourer ate before the war cost him then about 30 cents a gantang and the controlled price of similar rice in November last was, I think, \$1.50 per gantang.

I have questioned many labourers recently and they all said they could not carry on without at least six gantangs a month. In fact, they admitted eating this amount and even more and said that, in order to do so, they augmented their meagre ration under the control scheme by purchases in the black market where the price varied between \$3 and \$4 a gantang. To give another example: my own house boy who had been in my service for twenty years told me that before the Japanese overran Malaya, he and his family of three could live on about \$6 or \$7 a month. Just before I left he informed me he was paying \$30 a month for rice alone for himself and family and admitted getting most of it from the black market.

These approximate figures may give some idea of the increase in the cost of living to the Asiatic. To my mind, this is the crux of the problem of reconstruction in Malaya. It is stated in the Paper that the population is being given wheat and flour, but I think it is well known that Asiatics avoid eating them and certainly will not use flour as their staple diet. I think Mr. Newbould is rather optimistic if he believes Asiatics can be persuaded to substitute in any large degree the eating of flour for their centuries-old custom of eating rice.

They will have their rice and as the ration under the control scheme is inadequate it seems they are obtaining it through the black market. Where this rice comes from I cannot say. This however can, I think, be said that if it were not for the existence of the black market there might well have been very serious food riots in Malaya.

Mr. T. B. BARLOW: One or two points have been touched on in the paper to which I feel I should like to refer.

A month or two ago a statement appeared in an article in quite a responsible magazine

in which it was stated that the changes in constitution in Malaya were hatched up in Whitehall at the instigation of big business. This gross libel called forth a denial from responsible bodies in the city, and the author of the article made a very doubtful and half-hearted amend; but as this is a good opportunity I feel that it should be categorically stated that the change in the constitution was certainly not instigated by the city, nor were the large financial interests of merchanting, tin, banking or rubber consulted.

I am sorry that Mr. Newbould did not pay a greater tribute in his paper to the work which has been done by the rubber industry. In the matter of revenue the rubber industry was an immediate and vital asset to the returning Government, and it was an asset of which very small use was made. The Government failed to take any responsible advice and one can only describe the result as deplorable. However, the rubber industry was patriotic, and I doubt whether anything else in Malaya can be compared with it from the point of view of serving the public interest. In the matter of education they provide schools and houses, and they spend money in a way in which no other industry spends money.

There has been a lot of publicity about the loans which will be available, and if and when rehabilitation is agreed, these loans are to be a set-off to the rehabilitation money granted. Imagine my amazement on arrival at my office this morning when I received a copy of a letter from the Government saying that they would be pleased to grant a loan for the rehabilitation of some thousand acres which had been laid waste by the Japanese, and as a security for that grant they would naturally wish the property to be pledged, moreover they would also wish a very substantial sum of securities held in this country to be pledged for their benefit. It is deplorable. They say that they will give an advance but in the same breath tell you that you must pledge your collar, hat and overcoat!

With regard to trade unions, I cannot help feeling that the Government has allowed its enthusiasm to run away with its discretion. They are superimposing on the country a vast organisation which may be ideal and which may be desirable if there is money to pay for it, but the fundamental fact is that the country is incredibly impoverished and they must make the best of what they have already.

When I was in Malaya some twelve months ago or more, I could not help noting with a certain amount of amusement that one of the fundamental features of the Malayan Peninsula remained as lively as ever, namely, the jealousy between the mainland and the peninsula. Perhaps we should take courage from that because it shows that human nature is the same, and if only the Government will allow the responsible people in the territory, who, over a very long period, have done well by the territory, to work out their own salvation without too much interference, I hope that the future of Malaya will be far brighter than its glorious past.

Mr. JARRETT (in reply): I am afraid that I am in rather a difficult position with regard to answering questions. Like the first questioner, I was behind the wire also during the war, but he is more fortunate than I am because he has been able to visit Malaya again since and I have not. Therefore, my knowledge is very much second- or third-hand whereas his is first-hand. I think the best thing I can do is to pass these questions on to Mr. Newbould in Kuala Lumpur, and perhaps he will be able to provide some of the answers.

THE CHAIRMAN: If there are no other speakers I think it would be your desire that we should, through Mr. Jarrett, convey to Mr. Newbould our great appreciation for his Paper. He has given us an excellent account of the changes which have taken place in Malaya since the end of the war and the attempts which have been made to get back to something like normal. We have also heard certain speakers who have pointed out certain omissions in that Paper and, indeed, we may say that they have been critical of some of the remarks which are contained in it, but, as Mr. Jarrett has said, those comments will be conveyed to Mr. Newbould so that he may be aware of the reception

that his Paper received in certain quarters and, if he feels inclined, he may provide the additional information which has been sought.

It is not only the paper which has come in for a certain measure of comment, but the action of His Majesty's Government, and that, I think, is a matter which would have to be taken up by the speakers concerned with the responsible authorities. I am in no position to make any comments in regard to that aspect to-day. There is little doubt that the work which has been going on in Malaya, and the difficulties which have been experienced, have not been well known in this country, and I think that Mr. Newbould's paper will serve a most useful purpose by bringing forward the problems which had to be faced, the attempts which were made to deal with those problems, and the steps which are being taken for rehabilitation and reconstruction in the future.

On the question of rice, I should like to point out that the problem is not as easy as it seems, because if my information is correct, the fall in the exports of rice from countries which previously exported is very large indeed and is expected to be over three million tons even in 1950 or 1951. Malaya can only get a share of what is available.

With regard to wheat, the Eastern peoples do not like wheat and flour (I am speaking from several years' experience in Ceylon) as well as they like rice, but I think it is a case of that or nothing. Consequently, one can only hope that the rice position will improve. I do know that the Malayan Government is making every endeavour to stimulate and to encourage the further production of rice in the Malayan Peninsula. There is little doubt that in the past Malaya has not produced the quantity of rice that it should have done, but I hope that work in the future will concentrate upon extending irrigation and drainage and upon improving local food production in the country itself.

It remains now for me only to thank Mr. Jarrett for kindly coming here this afternoon and reading the paper prepared by Mr. Newbould. We all appreciate his assistance and recognise in regard to the questions which were asked during the discussion that he was placed in a difficulty firstly by not being the author of the Paper and, secondly, by not having been to Malaya very recently. Nevertheless, we do thank him for coming here to read this Paper.

The vote of thanks was carried unanimously with acclamation.

Sir SHENTON THOMAS: I feel sure you will not wish to go away without first expressing your thanks to our Chairman, Sir Frank Stockdale, for presiding over this meeting this afternoon. It has added greatly to the pleasure with which we have listened to this most interesting Paper by Mr. Newbould to know that we have had as our Chairman one who is so deeply engaged in the development of the Colonial Empire. It gives us an opportunity of wishing him every success in the work he has undertaken.

On your behalf I thank Sir Frank Stockdale for presiding this afternoon.

The vote of thanks was carried unanimously with acclamation, and the meeting then terminated.

Mr. NEWBOULT writes:

1. The facts and figures given by Mr. Neil are substantially correct. I thought that I had made it clear in the Paper itself that it is realised that the economy of the country has been seriously upset because of the shortage of rice and the greatly increased prices. He will be interested to know that even to maintain a retail price as low as \$1.50 a gantang on the meagre ration issued in 1947, a subsidy of some \$25 millions was required. I should add, in passing, that in addition to the basic ration, additional rations are given in the case of heavy labour, which for Chinese tin miners averages a total consumption of 5-5½ gantangs a month.

2. The figure which I gave in the Paper of rice availabilities from *all* sources, including local production, was only 43 per cent. of the amount of rice required to maintain the pre-war level of consumption. The price of black market rice is very sensitive. It varies from place to place and fluctuates sharply according to what the public consider the future of rice supplies will be.

3. With regard to the substitution of wheat flour for rice, I said that "there are limits to the extent to which any country will in a matter of two years change its basic diet", and I am fully alive to the difficulties pointed out by Mr. Neil. In 1939, the average import of wheat flour was approximately 5,500 tons a month, whereas at the present moment Malaya is consuming some 13,000 tons a month compared with the issue on the rice ration of 35,000 tons of rice a month.

4. I am afraid I do not follow Mr. Barlow's criticisms on the subject of trade unions. Legislation to provide for the supervision of trade unions had been introduced just before the Japanese occupation. On our return in 1945, we were confronted with a labour movement already in existence, and it was clear that Government's duty after the war was to guide this labour movement, which required no encouragement at all. The real question was not "Shall we have trade unions?" but "Are the trade unions to be good or bad ones?" The position had radically changed during the occupation and Government had to deal with a formidable problem in trying to transform a labour movement with a strong political bias into a trade union movement with an industrial bias, and thus establish effective methods of collective bargaining and of building up mutual respect between employers and employees. I do not understand his reference to a "vast organisation", because in helping to guide this trade union movement, the Government has confined its activities to giving advice to the unions. For this purpose the Trade Union Adviser's Department was formed and the approved estimates for the Department in 1947 were \$45,000. The present plans for expanding it include a proposal to send local Trade Union officers to England for training and for the appointment of further locally recruited officers for the Trade Union Adviser's Department itself. The estimated expenditure for 1948 has therefore been increased to \$88,000. It is interesting to compare this figure with the approved estimates for the Game Department for 1947, which were \$109,000.

5. If I may make a short comment on Mr. Barlow's remarks with regard to the jealousy between the Mainland and Singapore, I would say that, although instances have in the last two years arisen which support this opinion, there are clear signs that responsible opinion in both territories clearly appreciates the need for closer co-ordination on common problems, and Government has already provided machinery in certain cases to effect this co-ordination.

6. In a Paper which had already overrun its appointed length, it is difficult to make adequate mention of all the factors which have gone to the reconstruction work in Malaya. I did mention that by December, 1946, production of rubber had exceeded the average monthly figure for the record year 1941, and I agree that it is unfortunate that I did not underline this remarkable achievement with greater emphasis. The Rubber Industry rehabilitated itself very quickly, and in doing so was of great assistance to the country, not only in providing revenue at a time when it was urgently required, but in putting money into general circulation on a considerable scale. The Rubber Industry affects more people in Malaya than any other industry, and its speedy rehabilitation and the stabilising effect of the reopening of estates are appreciated as factors of the greatest importance in the general rehabilitation of the country. Mr. Barlow's other criticism I find more difficult to accept. In view of the financial difficulties of both the Malayan and Home Governments and the immensity of the problem of war damage, it was obviously not possible to design a final scheme and effect payments in respect of the latter during the early part of 1947. But as the financial position of certain Companies which had suffered considerable damage did not allow of the inevitable delay in the settlement of War Damage claims, the Government recognised that some immediate assistance would be necessary if the rehabilitation programmes were not to be delayed. To bridge the gap the Malayan Union Government introduced the Industrial Loans Rehabilitation Scheme. Since the extent of the payments, if any, under war damage was unknown, it was quite impossible for the Government to advance money without security, and in the case of Rubber all advances have been secured on the estates. In the circumstances I do not consider that this attitude could be regarded as unreasonable.

7. Since I wrote my Paper, the Federation of Malaya was constituted on the 1st February, thus ending the very difficult period of government under the transitional provisions of the Malayan Union Order-in-Council. An important feature of this new Federation is the Federal Legislative Council with a membership of 75, of whom only 14 are Officials. Local responsible opinion will thus be able to exercise a controlling influence over the Government of the Federation in the future. In preparing my Paper, I definitely gave first place to the constitutional developments which have occurred in Malaya since the war, as I consider these are by far the most important measures with a long-term effect. I quite realise that there are a host of other problems which may be of more immediate interest, but these, in the years to come, will give way to the greater constitutional changes which have taken place.

OBITUARY

THE HON. SIR HOMI MEHTA.—We regret to announce the death in the Shannon air liner disaster on April 15th, of the Hon. Sir Homi Mehta, K.C.I.E., K.B.E., the distinguished Indian businessman. He had been a Fellow of the Society since 1937.

Born in 1871, of poor Parsi parents, Sir Homi managed to come to Lancashire while he was still young to study engineering and the cotton industry. He then returned to Bombay and gradually acquired control of a number of cotton mills and silk factories. He later became interested in various sugar and chemical enterprises and entered the banking and insurance field. Apart from these business activities, he found time to enter public life. Among many other duties he was elected to the Council of State at New Delhi in 1930, he represented India at the League of Nations on two occasions, and, in 1941, he accepted the Presidency of the Bombay National Democratic Union which stood for strong support of the war effort.

GENERAL NOTES

DRAWINGS FROM THE ALBERTINA.—A hundred and twenty of the finest drawings from the famous Albertina Collection in Vienna are displayed at the Victoria and Albert Museum, where they will remain until May 29 before moving on to Leeds and Edinburgh under the auspices of the Arts Council. The aim of the selection is to illustrate those fields in which the Albertina is particularly rich, and the result is a dazzling assembly of the German and Italian masters of the sixteenth, the Dutch and Flemish of the seventeenth, and the French of the eighteenth centuries.

When the founder of the collection, the Duke of Saxe-Teschen, died in 1822 he bequeathed to his heir no fewer than some 15,000 drawings and 116,000 prints, an assembly which bears witness to his discriminating taste and has few parallels in the national collections of Europe. Included in the Albertina Collection (which is still housed in the Duke's palace on the Augustinerbastei) is a long series of drawings by Dürer, unsurpassed by those in the British Museum; and twenty-two examples of his work, ranging from the astonishingly precocious self-portrait drawn at the age of thirteen to a study of St. John for an engraving of the Crucifixion executed nearly forty years later, are now shown for the first time in this country. The sensitive study of "Hands in adoration", drawn with a fine brush on blue paper and heightened with white, and the no less famous water and body colour drawing of "A Hare" are included in the collection, but visitors would be wise not to overlook the claims of the less familiar studies of the head of an old man, and of a quay delicately drawn in indian ink soon after the artist's arrival in Antwerp. The Dürers and a series of Rembrandt's drawings—which includes a miraculously fresh and spontaneous sketch of a bridge over a canal—are for the most part finished works of art, recorded with no other purpose than to please the artist. In the Italian Renaissance drawings, on the other hand, as we observe particularly in Michelangelo's incomplete studies of figures for frescoes, it is clear that the Masters' principal concern was to solve problems of anatomy and pose before transferring the design to wall or canvas. But even if one considers each study only as a means to an end, how miraculous a work of art is Raphael's "Madonna with the Pomegranate"—which apparently was never carried out as a painting—or his sketch of two nudes in red chalk,

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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MEETINGS DURING THE NEXT FORTNIGHT

The following meetings will take place during the next fortnight:

WEDNESDAY, MAY 26TH, at 2.30 p.m.—Craftsmanship.—(ix)—Two papers on “CRAFTSMANSHIP AND THE SPARE-TIME WORKER”, by Miss Dorothy Allsopp, A.R.C.A., of West Hartlepool Art School, and G. A. Stevens, B.A., of Cooper’s Hill Training College. J. Howard Whitehouse, M.A., Warden of Bembridge School will preside. The papers will be illustrated by lantern slides and exhibits.

WEDNESDAY, JUNE 2ND, at 2.30 p.m.—Peter Le Neve Foster Lecture.—Craftsmanship.—(x)—“THE SPIRIT OF BRITISH CRAFTSMANSHIP”, by Professor A. E. Richardson, R.A., F.R.I.B.A. Gordon Russell, C.B.E., M.C., R.D.I., Director of the Council of Industrial Design, will preside.

MEETING OF COUNCIL

A meeting of the Council was held on Monday, May 10th, 1948. Present: Sir Harry Lindsay (in the Chair); Professor E. N. da C. Andrade; Mr. F. H. Andrews; Mr. A. C. Bossom; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Edward Crowe; Professor E. C. Dodds; Sir Thomas Dunlop; Mr. E. W. Goodale; Dame Caroline Haslett; Dr. R. W. Holland; Sir Henry McMahon; Mr. G. K. Menzies; Mr. F. A. Mercer; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. E. Munro Runtz; Mr. Gordon Russell; Mr. William Will; Mr. J. G. Wilson and Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Ager, Cyril Lawrence, Southall, Middlesex.
Bech, Anton Emil Schou, London.
Bowden, Wilfrid, Blackpool, Lancs.
Boyle, Patrick, Reginald, London.
Bradshaw, Albert Ernest, Liverpool, Lancs.
Branston, Richard Daniel England, Secunderabad, India.
Brown, John James, Newcastle-upon-Tyne.
Burton, Harry Marriott, Marandellas, Southern Rhodesia.
Bywaters, Hubert William, D.Sc., Ph.D., Sheffield.
Clark, Arthur Melville, M.A., D.Phil., D.Litt., Edinburgh.
Clarke-Smith, Douglas Alexander, M.A., London.
Curwen, John Patric, London.
Davey, William, B.Sc., Ph.D., London.
Devine, George, London.
Dorman, Bernard Elkington, Norwich, Norfolk.
Fójer, George, London.
Fidler, Miss Constance Louise, Liverpool, Lancs.

Foster, Arthur Bell, Birmingham.
 Hicks, Herbert Ronald, Tavistock, Devon.
 Hinton, Martin Alister Campbell, F.R.S., London.
 Hirst, Reginald John, C.I.E., Ashted, Surrey.
 Hodgson, Sir Edward Highton, K.B.E., C.B., London.
 Hopkins, The Rev. Thomas Clifford Millward, M.A., Wrexham, Denbighshire.
 Hugh, George J., Bridge of Allan, Stirlingshire.
 James, Captain George Albert, Cockermouth, Cumberland.



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Portrait of Dame Caroline Haslett, D.B.E., by Sir Gerald Kelly, R.A., exhibited in this year's summer exhibition at the Royal Academy of Arts

Kennedy, John Russell, Toronto, Canada.
 Laird, William, C.B.E., J.P., Glasgow.
 Liljegren, Professor Sten Bodvar, Ph.D., Upsala, Sweden.
 Livingston, Charles Sinclair, B.Sc., Bridgwater, Somerset.
 Lyde, Robert Edgar, A.L.A., West Hartlepool, Durham.
 Newton, William Godfrey, M.C., M.A., F.R.I.B.A., J.P., London.
 Nicholson, Charles Henry, Ferriby, E. Yorks.
 Nieboer, Hendrik Albert, London.
 Oliver, Francis Albert, B.Sc., Birmingham.
 Orr, William, Kilmarnock, Ayrshire.
 Park, James Ritchie, M.Sc., Kingston Hill, Surrey.

Peters, John Eric Leslie, Ipswich, Suffolk.
Plough, Norman Townes, London.
Riding, Douglas, M.D., Runcorn, Cheshire.
Sandoval Vallarta, Professor Manuel, sc.D., Mexico.
Sheridan, Dr. Vernon Arthur, Elstree, Herts.
Taubes, Frederic, New York, U.S.A.
Thompson, Thomas, M.sc., Gateshead, Durham.
Thomson, Alfred Reginald, R.A., R.P., London.
Thornley, Ernest Rayner, B.Sc., Gravesend, Kent.
Warner, Francis, London.
Weatherston, George, Newcastle-on-Tyne.
Whitlock, David Henry, Birmingham.
Wilson, Alan Herries, M.A., F.R.S., Kenilworth, Warwickshire.
Wood, Anthony, West Bromwich, Staffs.

Final consideration was given to the award of the Albert Medal for 1948 and a name selected for submission to H.R.H. the President.

The preparation of the balloting list for the new Council was completed.

It was reported that new designs for the obverse and reverse of the Society's silver medal had been prepared by Mr. Percy Metcalfe, C.V.O., R.D.I., and had been approved by H.R.H. the President.

The offer of the British Electrical and Allied Manufacturers' Association, to present to the Society a portrait of Dame Caroline Haslett, D.B.E., first lady member of the Society's Council, was accepted. A reproduction of this picture is given on page 354.

The Library Committee presented a report of progress made in the re-organisation of the Library.

A quantity of formal and financial business was also transacted.

LETTER FROM THE HOME SECRETARY

The following letter has been received from the Home Secretary relating to the Society's Address to His Majesty the King on the occasion of the celebration of Their Majesties' twenty-fifth wedding anniversary. (An illustration of this Address was given on page 309 of the *Journal*):

The Home Office,
Whitehall,
London, S.W.1.
30th April, 1948.

Sir,

The King and The Queen read with much pleasure the loyal and dutiful Address of the Council and Fellows of the Royal Society of Arts on the celebration of the twenty-fifth anniversary of Their Majesties' wedding, which I had the honour to lay before them.

I have it in command from The King to convey to you, as Chairman of the Council of the Society, Their Majesties' warm thanks for these congratulations and good wishes which have added to Their pleasure on this happy occasion.

I am, Sir,

Your obedient Servant,

Sir Harry Lindsay, K.C.I.E., C.B.E.

(signed) J. CHUTER EDF.

INDUSTRIAL ART BURSARIES COMPETITION, 1948

The Council is this year extending its Industrial Art Bursaries Competition, and now offers travelling scholarships, each of which is valued at £150, for designs in the following industries: Carpets, Dress Textiles, Footwear, Furnishing Textiles, Leather Goods and Domestic solid-fuel-burning appliances.

The primary purpose of these scholarships is to allow successful candidates to broaden their knowledge and experience by travel abroad and study of foreign design, or in certain cases to obtain industrial experience or art training in this country at an approved college, institution or industrial establishment. The scholarships are open to full-time or part-time students between the ages of 17-30 on October 1st, 1947, who aim at taking up Industrial Design as a career. Only those students whose ability is of a sufficiently high standard are eligible to compete, and the decision on this is left to the Principal of the student's school, from whom entry forms may be obtained.

The closing date for receipt of entry forms is July 31st, and designs submitted in the first round will be required by October 1st.

Copies of the detailed particulars of the Competition can be obtained from the Secretary or from the Principals or Headmasters of Schools of Art and Technical Colleges.

CRAFTSMANSHIP

(II) THE CONTEMPORARY STUDIO-POTTER

By BERNARD LEACH

W. B. HONEY, *Keeper of the Department of Ceramics, Victoria & Albert Museums, in the Chair.*

THE CHAIRMAN: I have great pleasure in introducing Mr. Bernard Leach to you, not that he needs any introduction. He will be known to you all as a potter who for more than a quarter of a century has worked as a master-craftsman at St. Ives in Cornwall, a record of continuous activity that is, I think, without equal among our artist potters. With great generosity too, he has published for the benefit of his fellow-potters all his recipes and processes in a book illustrated by many of his own beautiful drawings. In all this he has been sustained by a faith in the place of the craftsman in society which could not be quenched either by the enemy's bombs or even by the regulations of the Board of Trade.

I am sure you are eager to hear what he has to say, and I must not delay him. But I feel I ought to say a word about the significance of Mr. Leach's appearance here before this Society.

The full title of the Society of Arts, I would remind you, is "The Society for the Encouragement of Arts, Manufactures and Commerce", and its mission is now, I believe, summarised as the advancement of science in relation to the arts, manufactures and commerce.

The Society was founded at a time when men firmly believed that the application of the physical and mechanical sciences would solve all the industrial problems of mankind. They were right up to a point. The machine in responsible hands could save an immense amount of drudgery. But there was a grievous misunderstanding about its use in the arts. It was supposed that the admired forms of handwork could be reproduced mechanically, and the result would be "artistic", a work of "applied art". It was never recognised that the machine could have its own æsthetic. That is now well understood, not least, I am sure, by this Society.

What then are the characteristics of the modern machine style? I remember Mr. Leach himself, in a pamphlet of twenty years ago, used the words "plain and clean and strong". Mr. Herbert Read has defined its qualities as "precision, economy and simplicity". It is something made and multiplied from a blue-print, and its design may have the same virtues as those of an art-like architecture.

But so defined it must obviously lack all that freehand, living, *organic* quality that comes from the direct, immediate collaboration of artist and material. That quality is necessary for our spiritual well-being, not only in painting and sculpture, but in all the crafts. It is needed both for æsthetic education and for delight.

There is room for differences of opinion as to the scope of each of these two sorts of design, but that both are necessary is certain. They are complementary, though no bridge can be thrown between them. The essential qualities of fine craftsmanship belong to creative art and not to mechanical science. They are scientific only in the oldest sense of the word—they spring from *knowledge* of the profoundest kind—and no one is better qualified to expound them to you than Mr. Leach.

Mr. LEACH then read the following paper:

I originally intended to speak to you to-day extempore, but the more I thought about the matter the further the subject stretched out and the more responsibility seemed to attach itself to the moment chosen for these talks. Finally when I received a copy of John Farleigh's introductory paper I decided that I could not trust my momentary impulses and faulty memory so I have strung together various fragments of more considered thought, which I have put on paper during the post-war years.

It has been a very serious time for craftsmen as well as others—we were very nearly snuffed out—but those of us who could get together got closer and thought more deeply about the relationship of craftsmanship to life than, I believe, at any time since John Ruskin and William Morris started a movement which was in fact the *Counter-Industrial Revolution*.

The significance of the moment lies in the greater possibility of implementing our ideas (if they are true answers to need), than at any earlier stage. Changes are taking place in the basic order of our society and, therefore, in the period of reconstruction we have possibilities which never really presented themselves to Morris and his friends.

The time is too short and the illustrations too few to cover the world-field at all adequately, but I have endeavoured to allow neither preference for persons nor personal preference for pots to influence my judgment. I am aware how easy it is to deceive oneself in such matters, but I have one rare privilege and that is of having seen our problems of the West from the angle of the East and of becoming some sort of link between the two.

Before beginning, I would like to recall a few of Mr. Farleigh's points—some of the deepest and truest I have read in recent years: He dwelt on craftsmanship as an experience—as a way of life. He spoke of the equation of creative concept and its projection into and through material.

He made the case for the modern craftsman whom he called *the fine craftsman*. He stressed the timelessness and universality of the language of art, including the crafts: "In the timeless moments of creative execution the potter is guided by his material, clay, as much as he guides it", to which one responds feelingly and

with unquenched hope, "life flowing for a few moments perfectly through the hands of the potter". Mr. Farleigh concluded with the statement that, "no civilisation has been great without the culture which springs from free expression in the arts".

Creative work is an intensification and worship of life, and conversely, no art find expression without conviction and faith in its meaning and value, even if some contemporary expression appears to have a destructive character. For every kind of artist to-day this is the underlying problem—the meaning and shape of the life ahead. The immediate outlook is dark enough, but the potential exceeds by far any historical precedent. Least of all can artists and other men of imaginative vision afford to be reduced to impotence through fear, for it is through their perceptions that the inchoate future falls into rhythm and pattern.

The educated craftsman ever since the time of Morris and Ruskin, let us say from about the middle of last century, has by force of circumstance been more or less of an artist, that is to say, he has often received previous training as an artist or as an architect. He follows a craft as a vocation for the enthusiasm of the thing made by hand to the best of man's ability. Whether it be pot or poem, painting, music or sculpture, the type of man and his processes of thought are much the same. The social circumstances which have thrown him up as a reactionary against the over-mechanisation of labour at a certain stage following the Industrial Revolution have been similar in all modern countries. This kind of man or woman, whether a weaver such as Ethel Mairet, or a potter like Michael Cardew, is possessed of an insight into the epochs of man's culture and in his or her own workshop passes such influences through the mesh of personality.

Our problem is to preserve those qualities of concept, of material and of method, belonging to pre-industrial civilisation which are still valid to-day, adding to them an individual responsibility and a width of outlook which is our peculiar Western inheritance. This constant straining after perfection in the thing made may either continue alongside industry as a stimulus and example, or it may serve within the factory to redeem it from sheer commercialism.

We in England are the parents of industrialism. As such we have had more time to observe the effects of mechanisation and to begin to take its measure. It is but just that the evils inherent in the misuse of science should be understood and countered first by us. All over the East, all over the world in fact, the same thing is, or has been, taking place. Broadly the same sequence of events follows close upon the establishment of factories or the large-scale importation of mass-produced goods: local handcrafts are displaced; the close contacts between maker and consumer, between heart and hand, man and material, art and life, all these are forgotten or lost in a very few years; the fabric of life is torn, faith weakens, culture itself—the soul of a people—disintegrates.

The artist-craftsman should be the natural source of contemporary applied design whether he works in conjunction with industry or prefers, as most of us do, to carry out our ideas in clay, cotton, wood, glass, metal or leather, etc., mainly with our own hands and at our own tempo. The hand is the prime tool and it

expresses human feelings intimately ; the machine is for quantity, cheapness and at best a marvellous efficiency, but it turns man into a modern slave unless it is counter-balanced by work, which springs from the heart and gives form to the human imagination.

The studio pottery movement started about the year of my birth—1887—with Carriès and Cazin in France, and, a little later, with the Martin brothers in England. There was an early contact between them but little or no similarity of product. The Martins produced a great variety of salt-glazed stoneware in London some of



Courtesy of the Victoria and Albert Museum.

FIG. 1.—*Salt-glazed stoneware vase by the Martin Brothers*

which escapes from a tiresome Victorian grotesqueness by way of sound craft-technique to sufficient simplicity of form. The French sculptor-potter, Carriès, and his associates, the most notable of whom was Descœur, were influenced by Japanese Tea-Ceremony wares which, however debased in the nineteenth century, were, nevertheless, the ceramic expression of Buddhist and Taoist ideals—assymetric, withdrawn and dignified—quite different in spirit from the gay, hard, intricate porcelain and china, which developed in Europe from late Oriental stimuli, and which were mainly Mohammedan in inspiration.

Our next potter of this category was the novelist William de Morgan who worked under the inspiration of Persian lustre-painting, but without the advantage of a handcraft tradition, with the inevitable result that such qualities of design as he and a few others possessed were spoiled by the deadly monotony of plaster cast shapes and standardised types of industrial clay, pigment and glaze. At this preliminary stage the laborious efforts of genuine enthusiasts to achieve an adequate means of expression for hand as differentiated from machine work should be regarded with sympathy, for the conditions proper to natural materials had been too long broken.

The sensibility of the artist-turned-potter has found stimulus in the work of every age and country, from Neolithic bone-smoothed pots of pre-history, black and red with the smoke and flame of primitive open fires, to the height of perfection of form, pattern and glaze in T'ang and Sung China, or to the delicate "sky after rain" celadons of the hermit kingdom of Korea. When I left England in 1909, the museums of the Western world held but few specimens of such pots. For centuries we have been conditioned to the comparatively artificial perfections of a late Chinese court taste. Elaborately enamelled porcelain, imported by the English and Dutch East India companies, stimulated our own sophisticated court circles and caused widespread emulation of Chinese porcelain to take place all over the West. For centuries fantastic efforts were made to copy this hard translucent white substance, the secret of which was only revealed through the letters of a French Jesuit, Père d'Entrecolle, from Chin tê Chên in the early eighteenth century. When I returned to England in 1920 Sung wares had been given the place of honour in the museums of Europe and America, where, prior to my journey eastwards, the wares of Ming and Ching had held sway. This change of values in ceramics was great, or greater, than corresponding re-assessments which occurred about this time in our painting and music. It was greater, maybe, because we had no European pots comparable in refinement and nobility of conception. Beyond the discovery of yet another field of delight for the spirit of man we apprehended a supreme epoch expressed in clay. Herein the West has begun to perceive the complementary value of the East perhaps more keenly than in any other direction. Those Sung pots in the Chinese Exhibition at Burlington House about 1935 gave us English the seismic tremor of great art. The proof of the depth of an impact lies, however, in its outcome—what we actually do as the result of being deeply moved.

The contemporary movement among studio-potters has one common denominator, other than a general participation in what I have called counter-industrial revolution, and that is the practical interest shown in Europe, America and Japan in the recently uncovered work of Sung potters. The release of this ceramic beauty, due to the construction of Chinese and Korean railways and the resultant disturbance of early graves in which these pots had been buried with the dead, has caused a ripple of responsive enthusiasm to run round the world and a new standard of achievement has been set for the modern potter to assimilate. In the Paris Exhibition of 1937, this new influence was predominant in the work of young potters from all over the world.

In my opinion two countries have been better equipped to absorb and assimilate the varied stimuli offered by evolving circumstance and it is for that reason that I think they have produced the best modern pots—we who live in smallish island off the coast of Europe and the Japanese who live in corresponding isles off the coast of eastern Asia. The sea strip has, in both cases, been a safeguard, so that each nation has become the repository of the culture of a continent. It is odious to praise oneself at the expense of others but this is not a judgment on personalities, nor will any informed person accuse me of race prejudice. I love the French and I have respect for the way of life evolved in Scandinavia, but the pots which come from these two sources strike me, and most of my fellow English and Japanese potters, as lacking life for all their smooth and conscious control.

In France pots have not been produced with the same flow of national (and international) genius as have pictures, partly perhaps because of the artificial barrier created by the over-distinction between “beaux arts” and “arts décoratifs”.

In America there are many individual potters, but it appears to be too early for a mature cultural expression. Something inter-racial is involved.

In Russia pottery does not seem to have been a national mode of expression and it is difficult to see how handicrafts fit into its present economic pattern.

In Austria natural sensitiveness suffers from Viennese artificiality.

China has suffered too much decay, disorganisation and invasion to contribute her incomparable genius to the modern problem.

It is not inappropriate that in Europe, England, which was the birthplace of industrial revolution, should also be the source of counter-revolution.

This brings us to the necessity of speaking of my own experience as the link between Japanese and British potters, because the influence of each upon the other has been remarkable and has contributed vitally to the modern movement.

I was born in Hong Kong and my first years were spent in Japan in the care of my grandparents. To this fact and the subsequent reading of Lafcadio Hearn was due the impulse which took me back to the East at the age of twenty-one, after a short training in art. I went to find out for myself what this strange Eastern art, and the life behind it, meant. I taught etching and, with my wife, English, but fortunately it was not long before I abandoned the idea of teaching in favour of learning, and it was due to this fact that the younger writers and artists treated me as one of themselves. Little did I imagine at the party of artists to which I was invited in 1911 that the excitement which I felt at the first sight of pots being fired, which had just been painted by the guests, including myself, would eventually lead a Tomimoto or a Hamada to become potters, or to my own setting up as a potter in England and the subsequent teaching of Cardew and others, but so it happened.

After that experience I set about finding a master and was eventually introduced to Ogata Kenzan—the sixth in succession of one of the most famous lines, or schools, of potters—and became his sole pupil. Later, Tomimoto also worked with him and to us both he gave the traditional knowledge and recipes with which passes mastership.

Kenkichi Tomimoto trained as an architect and then studied in England and in India. He is a pungent and delicate artist and a fine calligraphist. His faculty of making original brushwork patterns is unique in Japan.

This studentship of ours did not resemble traditional Japanese apprenticeship because both of us were mentally and culturally far removed from our master. Tomimoto and I were certainly closer in friendship and depth of common interest than ordinary brothers and we each had an affectionate regard for old Kenzan, but, although there were highly trained craftsmen in Japan, such as Makuzu Kozan with whom I also worked for some months in Yokohama, yet not one was æsthetically conscious in the international and contemporary sense. Thus, when they, and still more the peasant weavers, lacquerers, potters, etc., attempted to graft



FIG. 2.—*Porcelain dish with blue brushwork pattern
by Kenkichi Tomimoto*

foreign ideas on to an already weakened national stem, the results were disastrous. This phenomenon, unfortunately, is constant throughout the East.

For most of nine years Tomimoto and I were friends and rivals. Being the first in this quest, and at that time having little knowledge of living craft movements in other countries, we had no set guide to thought and process, so we bought our experience expensively, but what we learned thereby we really knew. The search after form and pattern occupied our nights and days, for we never supposed that the mere imitation of old styles would lead anywhere. We were in fact gropingly with occasional flashes of light (quickly and gladly shared) synthesising on racial, cultural and personal lines, each according to his own very different inheritance. He was my only companion on this adventure and search until the end of my time in the East, when Hamada arrived from the Kyoto Pottery School wishing to escape from its atmosphere of pedantic scientific exactitude towards a more intuitive and

basic means of expression. He came to England with me in 1920 and for three years helped to start the St. Ives pottery.

Realising from the outset that all over the world the crafts of pre-industrial man were being destroyed, almost overnight, for lack of vision, we came to the conclusion that correspondingly heart-felt work must to-day be under the control of the artist. He was twenty-eight, I think; I was thirty-three. He had not exhibited, whilst I had been launched in his country for ten years. He had had a scientific training; I had not, but I had made my mistakes and had thereby gained some experience. Like his own pots he was well ballasted. It was a happy and profitable combination. We worked hard but with the irregularity of mood. We destroyed pots, as artists do drawings and paintings, when they exhibited insufferable shortcomings to our own eyes, what Hamada called "*tail*". We only turned out 2,000 to 3,000 pots a year between four or five of us and of these not more than 10 per cent. passed muster for shows. Kiln losses in those days were high—quite 20 per cent.—and so the best pots

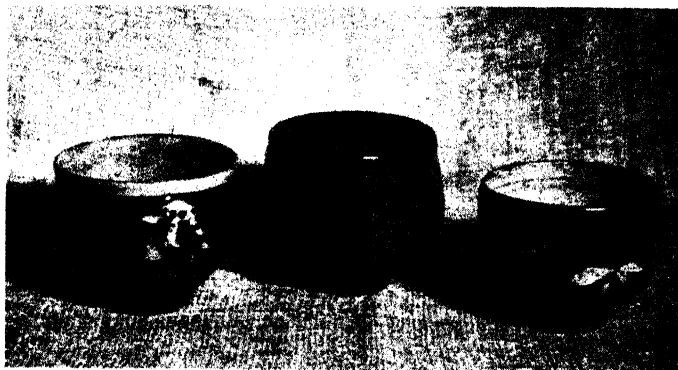


FIG. 3.—*Three stoneware tea bowls by S. Hamada*

had to be precious and expensive. The background of thought which we brought to the undertaking was that of the artist turned craftsman; so it was with Morris, Gimson and Edward Johnston.

One of my objects in returning to England in 1920 was to make contact with the soil of our own traditions. I had become increasingly aware of the danger of becoming rootless, so when the harrow turned over chards of old English combed slipware oven-dishes in the field opposite the pottery Hamada and I carried them in to our fireside and turned them over and over, discussing their character and probable technique during many an evening meal. By guess-work based on bits of evidence gathered from here and there, and experience gained in Japan, we gradually re-discovered most of the methods employed and so regained a tradition which had nearly vanished from this countryside. Proceeding very circumspectly we, and later Michael Cardew, added new forms and patterns, some of them borrowed from the East. Other potters are now working on the same theme not only here but also in Japan, where I found in 1934-5 the idiom of the English slip-trailer in use in three other potteries besides Hamada's.

Behind the breadth and warmth of eighteenth century peasant pots lies the grand

medieval and monastic earthenware of this old land of ours, and their influence too has begun to be felt as a native balance to Far Eastern dreams.

Thus we commenced. Then Hamada returned to Japan in 1923 and set an example in restraint and modesty to all studio potters by making common kitchen crocks for the Tokyo market alongside healthy village potters. Having gained their respect as a good workman he then began to develop local materials, and with their support, to meet a wider and more modern demand. Evidence of this was the roadway, which I found constructed in 1933 leading to his farm house. It was a gift from the small potter's town of Mashiko.

Meanwhile at St. Ives we had a long struggle to make ends meet, and had it not been for the money which continued to come from the sale of my pots in Japan, it would have been impossible to carry on. After the exhibition of one of our consignments a penetrating, disconcerting, half-hidden criticism found its way into a



FIG. 4.—*Black slip-ware jar by Michael Cardew*

letter from my old friend Soyetsu Yanagi, the leader of the Japanese craft-movement, "We admire your stoneware but we love your English slip-ware . . . *born, not made*". That sank home, and this, together with the growing conviction that pots must be made in answer to outward as well as inward need, determined us to counterbalance the exhibition of expensive personal pots by a basic production of domestic wares. We have come after twenty-eight years to aim at a high common denominator of belief and in the sharing of responsibility and profits under the willingly accepted leadership of an artist. This is our faith as the result of experience in Japan and England. It is the only answer we have found to the crying need of our age for creative beauty. By this means we appear to have solved our main economic problem as hand-workers in a machine age and to have ascertained that it is still possible for a varied group of people to find and give real satisfaction because they believe in their work and in each other. To me the most surprising part of the experience is the realisation that, given a reasonable degree of unselfishness,

divergence of æsthetic judgment has not wrecked this effort. When it comes to the appraisal of various attempts to put a handle on a jug, for example, right in line and volume and apt for purpose, unity of common assent is far less difficult to obtain than might have been expected. Thus, many of the standard pots which we catalogue and send out to the extent of about 15,000 a year, although most of them started as my ideas, are being constantly modified and improved by the contribution of one or another of the group. It has also resulted in lessening the dominance of eastern shape and decor by the health-giving effort to answer need—the practical tea-pot, porringer, egg-baker and pitcher requirements of the English people who buy the pots. It is in the consciousness and unity of such groups, or teams, that in this and other workshops a belief in the development of craftsmanship is gaining ground. The obsession with the individual “artist” point of view appears to be lessening. That a stress had to be laid not only, as Eric Gill put it, on “every creative worker an artist”, but especially upon the most creative. The outstanding English potters

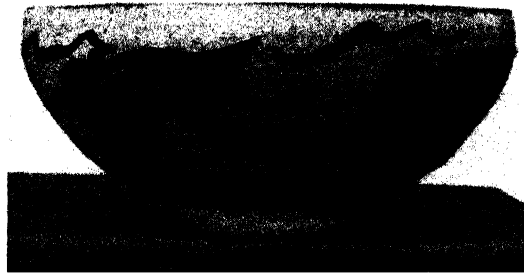


FIG. 5.—*Stoneware bowl* by Staite Murray. *Rust brown brush-work and sgraffito on oatmeal glaze*

who correspond to Tomimoto and Hamada in Japan are beyond question Staite Murray and Michael Cardew. Mr. Murray was making a very high fired stoneware, mainly inspired by Sung pottery when I arrived back from the East in 1920. More than anyone else is he responsible for raising the standard of artistry in pots, both directly by the creative character of his best work and, indirectly, by teaching younger potters, such as Sam Haile and a number of other talented young men and women, at the Royal College of Art. The effect has been to re-unite the æsthetics of this craft to the general stream of contemporary art. Although Sung stoneware has been the predominating inspiration it would be a mistake to conclude that the artist potter of to-day is only adding a chapter to the story of Chinese influence on European ceramics. Many other stimuli are affecting us simultaneously. We craftsmen have, for the first time, the whole world and all history to draw upon. It is difficult for the artist to keep steady under this barrage, to live truly and work sanely without the sustaining power of traditions which guided all the yesterdays of applied art. Spoiled and denuded countrysides the world over witness sadly how much more difficult it is for simple and narrow artisans whose forebears have left us the great heritage of unconscious beauty in things. I have seen in two hemispheres how

defenceless this kingdom of beauty is under the onslaught of modernity. After the slow maturing of centuries the flower-like loveliness dies so briefly—everywhere. Men like Benvenuto Cellini in the West and the First Kenzan in the East were court-artists—cultured and aware of comparatively wide relative values. Since then horizons have opened out vastly and now we are all heirs to general knowledge, but in the process much has been lost of direct sensory understanding. Our knowledge is of the brain and nine-tenths of the things which we use with our hands lack the human touch and it is this which gives significance to the craftsman's plea.

Michael Cardew was the first student-apprentice who worked at St. Ives after Hamada's return. The slip-ware which he subsequently made at Winchcombe, though more traditional than Murray's stoneware is recreative and essentially English and it holds its own with the past admirably. This I had an opportunity of verifying only a few days ago in Hanley Museum by extracting old and new pots from the showcases and placing them together for comparison.

Following Cardew came Katharine Pleydel Bouverie and Norah Braden, in successive years. Later on they set up together at the Cole pottery near Swindon which, whilst the partnership lasted, turned out some of the most sensitive modern pots. They developed, amongst other things, the Oriental use of various wood ashes in stoneware glazes, and so obtained from rose and box and other local vegetable sources inimitable and most beautiful effects. They were helped in this direction by the sculptor-potter Charles Vyse and his chemist wife, who turned from the production of glazed figures and reproduced with astonishing skill many of the Sung glazes.

Behind these well-known names stand two or three times as many younger men and women, and far more are clamouring for an adequate training. We alone have had to turn away well over 100 applicants during the last three years, and it is the same story in other potteries and craftsmen's workshops. I am told that there is a still larger proportion of young French and Germans who gropingly seek a means of positive and expressive life-work in the making of pots. These people come out of the bitter destructive experience of the war. Their pain is our hope. How many times whilst travelling to and from London for national craft committees, during long night hours in overcrowded trains, did I hear men in the Forces say, "When this — — show is over I will never go back to the old job; I want to do a job I can enjoy". More and more young people want that—to make or enjoy things which are an expression of themselves, of life, and not mere means to ends. There is promise for the future if this need can be met, but how?

Crafts such as ours are not learned in art schools where there is no basic production for use, where there are not nearly enough teachers who can find and prepare clays, who can throw proficiently on the potter's wheel, who can design and build a kiln and make their own pigments and glazes. The number of picked post-graduate students who have come to me from the best art schools who could do any of these things is negligible. Things are improving, but they have been unbelievably bad. The more sensitive of these art students do become responsive to art, and can sometimes draw and paint, but one is left with a sense of dubious wonder as to what becomes of all those others who pass through art schools. Are they going to teach arts and crafts too—the blind leading the blind *ad infinitum*? How can half a

dozen crafts be acquired in a couple of years? Can two hours a week (on wheels generally without seats) enable anyone to learn to throw to the very modest standard of twenty pots an hour to fixed weight and size? I remember a morning, over forty years ago, when Henry Tonks came into the men's "life" class at the Slade, slowly walked round behind the easles with a deepening sardonic frown on his surgeon's face, stopped, and in the silence said, "Well—I want to know when any of you are going to show signs of becoming artists". With that he walked out.

Crafts such as pottery depend, as it were, upon a slow passage of time: the gradual transfer of the bodily knowledge of the right use of material and the intimate co-operation of small groups of workers. Break those threads and disperse the men and their tools, and an heritage is lost for ever. This is one of the contingent tragedies of total war and it is the more poignant because craftsmanship in its essence is the antidote to mass-production and the craftsman is the residual type of fully responsible workman. This responsibility comes to its maturity with conscious knowledge. At that stage the artist-craftsman can gather his group together and start a contemporary tradition and so pass on to another generation a part of what he has extracted from life. Such teaching can only be given to a very small number of students unless a new kind of crafts schools, as a work-shop extension, should come into being. But at that stage the craftsman would need the support of the Board of Education.

In 1934 I re-visited Japan at the invitation of my old companions of art, particularly those associated with what had become a national craft movement. During the space of one year I worked in seven potteries and crafts centres, including Hamada's and Tomimoto's, and travelled 4,000 miles in central and southern Japan with Mr. Yanagi and Mr. Hamada collecting examples of remaining folk arts, lecturing, discussing, planning. This effort resulted in the building and maintenance of a beautiful National Museum of "people's art" which fortunately escaped destruction by Allied bombers although all the surrounding houses were burned down.

I found the movement in Japan more alive and better organised than its counterpart here. It had a very remarkable leader, my old friend, Soyetsu Yanagi, PH.D., a profound student of eastern and western religion and art, besides the active support of Hamada and other craftsmen and potters in particular. It published the most beautiful monthly *Kogei* I have ever seen, which served as a focus of thought between all kinds of craftsmen and craft lovers. This is not the place in which to attempt to describe the happenings of that year. It was the fullest and most rewarding in my life, humanly in sharpest contrast to the terrible apparition of Japan which war has brought to the mind of the West.

In 1940 *The Potter's Book* was published. It has sold remarkably well and the letters which I have received from all over the world, mainly from potters, show that, however inadequate, something of the kind was widely needed. In writing openly about the methods and recipes employed by potters of the past, as well as those which we have evolved for ourselves, my intention was to do something to break down an unfortunate and pointless habit of secrecy which studio-potters had inherited from a background of competitive trade. In art there are no secret short-cuts to the

realm of beauty. But there are principles as well as practice, and about both craftsmen can afford to be frank. I have tried to remove some of the obscuring veils, and that, no doubt, explains the response. I devoted some pages in the first chapter to the bed-rock question of what constitutes good form in pots, but here I shall labour but one point of divergence from the great but entrenched achievements of the English pottery trade. We aim at living shapes and believe that the life which can be put into a pot is the expression of living force in designer and executant. Mechanical reproduction rules out half this life and severely limits the designer to boot. This fact is inescapable. The more these functions are unified, the more chance there is of vital springing form and of a living orchestration of pattern. As to brushwork



FIG. 6.—*Stoneware pot, Ritual Dance, by T!S. Haile, 1939, from the Collection of the University of Michigan*

and pattern I find I cannot write again as tersely as I did in *A Potter's Book*, so I quote: "The use of the brush is in itself a wide subject, especially to anyone who has lived in countries where a hair-point takes the place of metal instruments for writing. Our western use of the brush is comparatively limited, not so much from lack of skill as from ignorance of the range of brush-drawn line open to Oriental peoples who seriously regard their lettering as a means of the highest artistic expression. Compared with the flexibility of the brush, a stylus, a graver or a pen only allow play in one dimension. We are accustomed to pushing, prodding and scratching, but not to the feather-weight touch of soft brushes. If to-day we knew something about the craftsmanship of our own writing it would provide us with a reasonable point of departure for the investigation of a more highly developed art, but very few of us do, and a suspicion arises that there may be something the matter with a people who have become literate and yet have lost the skill of the pen. If it is true

that nothing betrays a man more than his handwriting, this is doubly true of brushwork. In the flow of the soft point his real character is revealed. Decision or hesitation, sensibility or dullness, breadth or narrowness, tenderness or sentimentality, are all nakedly exposed. Why then, since at best it would only seem to be a disguise, should a student struggle to develop a technique of brushwork? The real



FIG. 7.—Stoneware bottle, brown brushwork on cream by Bernard Leach, 1930

value of such a training, however, is not to acquire technique as an end in itself, but as a means to an end. The only risk is that of losing sight of the objective; the gain, and it is one which we instinctively feel, lies in finding a way out of weakness as the brush reveals it to us. The degree to which artists and craftsmen are able to endure the visual evidence of their actual selves, when it is brought home to them by their own hands, depends largely upon the depth of their love of truth and beauty.

“The value of a living tradition is that it makes this kind of training more accessible

to those who are capable of acquiring it and canalises their gifts in creative communal work". The most valuable lesson which the artist-potter has begun to learn about brush strokes is that their vigour depends upon what Chinese call "bone"—the straightness of constructional thrust and the articulation of movement to movement underlying curvature. Of pattern we know still less to-day—the invention of motifs of decoration reduced to utmost simplicity and significance—analogous to



FIG. 8.—*A recent group of domestic stoneware by the Leach Pottery team*

melody and proverb. It almost seems as if we had become too complex to exercise this ancient faculty of simpler men.

I hope I have managed to show that the phenomenon of the *artist-potter* is sufficiently widespread to suggest that these people have sprung up spontaneously at a certain stage of industrial evolution in answer to need. But the first shock of surprise has had ample time to pass off and suspicion and acrimony might now give place to an interchange between the theory and precise practice of applied science and the imaginative and equally real æsthetic approach of the fine craftsman. As a hand-worker himself he has naturally a closer and warmer appreciation of all

pottery traditions preceding mechanisation and is therefore in a better position to assimilate fresh influences as they become available.

The inducements to make a link with industry have been lacking so far: lacking in probability of sound results, in conditions and in reward. Few of us work in close contact with machine production and most of those who do so get the worst of the bargain. I have no brief for a puritanical aloofness, but it may be a good thing to give some of the reasons for what may otherwise be too readily interpreted as a kind of art-snobbery. Industry must want us before we can make any reasonable approach. So far it does not know what we have to give. It is a position with both sides to blame, or rather if the matter is viewed sympathetically, with neither, for the vicious circle which is just beginning to break down is the almost inevitable outcome of given conditions. Craftsmen as the residual type of fully responsible workers do look upon industry in its present form as largely anti-social. By our way of life we imply another set of values, one in which neither money nor coercive power are ultimate standards. We believe in the most responsible and therefore the best work, and regard the avoidable absence of this incentive as one of the principal evils of our age. We craftsmen of England are fighting against the anæsthetic of heartless repetition, against the Bedeaux system, against "music whilst you work", against jazz, cinema and wireless, and all the dope which clogs the release of healthy talent. We protest at the creeping paralysis of state centralisation replacing personal responsibility, and at the concept of man as a mere cog in a machine. Craftsmanship involves an inherent and absolute value in the thing made, and implies conditions of labour in which such perfection can be achieved, in other words, conditions in which men and women can really live in and through their work. All craftsmen are concerned with the effort to make things as excellently as possible within the necessarily strict limits of usefulness, but the fact is that as soon as creative intention ceases to control the processes of manufacture directly (as when re-duplicated work is delegated to the machine) a cleavage takes place. The words "hand", "tool" and "machine" indicate degrees of intimacy between conception and execution, but as soon as the function of the prime tool—the human hand—is recognised the antagonism between hand and machine tends to lessen. At one end of the scale is creative thought expressing itself as directly as is humanly possible: at the other, the automatic repetitions of mass-production. There is a cool modern perfection in the best mechanical products involving pride in machine craftsmanship, and a new type of engineer-artist, but the distant control inherent in mass-production, combined with the ca'canny of safe dividends to shareholders, results in things for daily use which give neither maker nor user full satisfaction. The rather limited idea of functionalism prevalent, leading as it does to contentment with better design for the machine, makes it all the more necessary to state the case for the human being as a worker, as a craftsman and as a creative artist.

During the second world war the few remaining craftsmen were driven by "call-up", by bombing, by lack of materials, by confusion and red-tape and by the absence of any final authority in matters concerning art to take stock of the whole position. We met month by month under the auspices of the Central Institute of Art and Design and constantly put our difficulties before the various Ministries and even in Parliament. Some help we received but for the reasons given above it was not

fundamental. Now, however, the situation has suddenly improved. The craft societies have come together and given unanimous support to the constitution of the newly formed *British Craft Centre*, which is to be a National Council, democratically elected, representing the interests of fine craftsmanship. There will be a permanent exhibition, as well as passing shows, in a good house in Central London. Substantial financial support will be given by the Government, but craftsmen's affairs will be left within craftsmen's hands. Only those who know what a struggle we have had will fully recognise the importance of this official recognition. Most of our slowly built up workshops were closed, many of them for good. Threads of tradition running back through centuries were preserved in some, whilst others were experimental laboratories in which artist-craftsmen attempted the fusion of cross-currents of culture. Within the framework of post-war England there is a place for the craftsman's contribution to national life, but it has to be secured by convictions held in common and made known to a wider public. Good handicraftsmanship is directly subject to the prime source of human activity, whereas machine-crafts, even at their best, are activated at one remove. For this reason above all others, artist craftsmanship justifies its existence near the heart of any culture worthy of the name, even when it stands alone as an exemplar and reminder.

In this time of flux and re-organisation we, as responsible craftsmen, have an essential contribution to make in clarifying and fighting for the basic principles of work—that work which is at one and the same time recreation and labour, and in which use and beauty are inseparable.

THE CHAIRMAN: I should like to propose a cordial vote of thanks to Mr. Leach for his charmingly informal lecture which was so full of practical and other kinds of wisdom.

The vote of thanks was carried with acclamation, and the meeting then terminated.

CRAFTSMANSHIP

(V) ENGLISH SMITHCRAFT

By J. SEYMOUR LINDSAY

Wednesday, March 3rd, 1948

Mr. H. S. GOODHART-RENDEL, P.-P.R.I.B.A., *in the Chair*

THE CHAIRMAN: In these days when most of our attention is concentrated on the superlatively difficult crafts of eating and existing, we are apt to forget that all the time we may be losing crafts which it is worth eating and existing in order to enjoy. A very English craft is that of wrought ironwork which is, roughly speaking, what English smithcraft signifies. I am not going to waste any of your time in preliminary words, but I should remind you just how very well qualified Mr. Lindsay is to speak on this subject. I do not think anyone knows more about historical ironwork than he. He is also capable, in a practical way, of getting the most beautiful ironwork done from his own designs as is exemplified by his work in St. Joseph's Chapel in the Cathedral of Westminster. You will also find in him, as I have found from my friendship with him, that sensitiveness which is not only to be perceived in a person but in his work and in his draftsmanship. I am sure that we can expect an extremely interesting paper from him.

The following paper was then read:

The subject I present to you to-day is Ornamental Wrought Ironwork. This is the name by which domestic ironwork of an ornamental character is known

—a somewhat misleading title as it implies that ornament is its chief purpose, whereas in reality it is usefulness. Ironwork when used architecturally without exception performs some definite service.

We have during the last hundred years suffered an ever-quickenening shrinkage of most of our crafts with the inevitable result that we have arrived at the time when our craftsmen in the traditional sense of the word are becoming extinct. I look upon a craftsman as a man who exerts his skill to produce the best he can and finds nothing too humble to have pains bestowed upon it. Their passing represents a loss to the country, the magnitude of which it is difficult to estimate. They represented a large proportion of the community down to the coming of big industry and acted as an ever present leaven that worked persistently through the whole country. They maintained a standard of work, the excellence of which is only realised by examining examples of their labours which have remained to us.

Our thoughts to-day are not so much with the past as with the future. Our belief is that the working of iron in the traditional method can again be sought for its usefulness. And by traditional methods I don't mean a slavish copying of traditional designs but rather the technique employed in their production. Our hope of such a revival lies in exciting an interest in the minds of the general public, who, at the moment, are for the most part unconscious of its evolutionary history or the manner in which it has and can be worked. I will, therefore, present to you some examples which are representative of the passing changes both in taste and handling. But first a few words upon the man and his methods.

The blacksmith is, in fact, a sculptor-modeller working his material in a plastic state, but it is only plastic when at great heat. When it is remembered that this plastic state is quickly dissipated when withdrawn from fire to anvil, one may form some idea of the skill and judgment required. So the smith works the iron into definite forms during a succession of short periods. Contrast this with modelling in clay or wax where your medium is always consistently plastic and can be handled with impunity, and you will form some idea of the great art which these men exercise in producing even humble things like horse-shoes.

Generally speaking, the methods of blacksmithing are common to all periods. The fundamental principles of shaping malleable iron have undergone no change throughout the ages. The Belgic smith making nails and slave chains obtained results in the same way as we do to-day. Much has been added to our equipment: metal is obtainable in bars of various sizes and sections, and sheet metal is rolled in many gauges; but to shape iron you must heat it and hit it by hand. There is no mechanical short cut any more than there is in producing a portrait in paint or stone.

To appreciate wrought iron to the full it is necessary to have some idea of the way it is fashioned or wrought.

There are three distinct processes connected with this craft: blacksmithing, sheet metal working, and fitting. Blacksmithing is the oldest process by far, going back to pre-history. The sheet metal or white smith, and the fitter make their entry as a class into the craft when architectural and geometric designs with the complicated building up of Gothic tracery came into favour. These three processes were, and still are, often mastered by a single craftsman.

It seems almost a miracle to see a sheet metal worker raise a leaf or mask from

a thin sheet of iron by just hitting it often enough in the right place, but skilled as this work is it is not so exacting as that of the blacksmith.

The two main ingredients in creating beauty in wrought ironwork are line and modelling, which might be expressed as design and execution, both essential to success. To be certain of this it is only necessary to study existing examples that remain to us. I therefore propose to show a few specimens of the various periods.

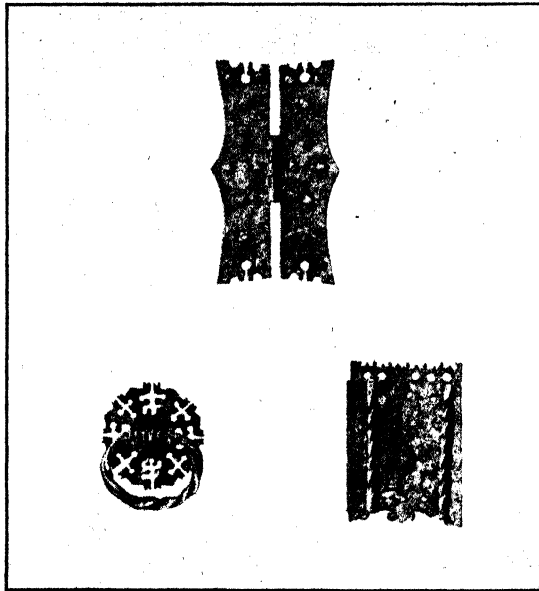
The earliest examples of a definite period are probably the barbaric fragments



FIG. 1.—*The Eleanor Gulle in Westminster Abbey. Smith Thomas de Leighton, A.D. 1292*

which are found remounted on church doors in east and south-east England: symbols and mystic motifs which suggest Scandinavian influence. With the strap work ornamented with incised lines and punch marks and animal heads fashioned in full relief, the work shows fine smithcraft. Examples exist at Staplehurst and Stillingfleet, and there are quite a number of others. As the country became more settled the designs became more ordered and developed into the magnificent Romanesque mountings as represented by the church doors of Hormrad and Haddescoe churches, and the slype door hinges from St. Albans Cathedral. Door

mount designs conformed with the Gothic taste and some of the most sumptuous and beautiful examples were carried out in the Early English manner. A new tool was used to a limited degree in this period. It consisted of a small steel die into which metal was hammered when hot. This produced leaf and flower forms that were welded on to the stem and terminals of scrolls. One great example of this class of metalwork is the Eleanor grille in Westminster Abbey by Thomas de Leighton, successor to Henry of Lewes who may have introduced the method. The use of dies is restricted to a period from the mid-thirteenth to well into the fourteenth century. Prominent amongst other examples of this type are the hinges of the cope chest in York Minister where the details are remarkably similar to the Eleanor



By Courtesy of the Ministry of Work.

FIG. 2.—*Metal mounts on the fifteenth century linen-gold muniment cupboard in the Guildhall, Boston, Lincs.*

grille and the very lovely coverings on the west door of Henry III's Chapel, Windsor, and at Merton College, Oxford.

When the pinnacle of perfection of any technical rendering has been reached it would seem that a change of taste is foreshadowed.

During the fourteenth century an entirely new technique was adopted in the working of iron. This amounted to taking stone or wood-carving designs and translating them into wrought iron. The heavy constructional members were forged in the traditional manner but worked into architectural forms by the use of saw, chisel, file, punch and drill, more in the manner of locksmithing. Much plate and sheet iron was used, pierced and overlaid to form Gothic tracery of great richness.

The Continent may have given us a lead in this class of smithcraft as there were, both in France and Germany, smiths highly qualified in this technique. Whatever

country introduced it, this country holds the honour of producing the greatest known example. This is the iron gates and side towers of King Edward IV Chapel in St. George's Chapel, Windsor, by John Tresilian, the King's Smith. It dates from about 1480. St. John Hope gives a very complete description in his monumental work on Windsor Castle. One sentence is of particular interest. He says "There are so many points of resemblance, too, between certain features of this iron monument and those of the tabernacle work of the stalls as to suggest that the head smith and the chief carpenter were working near each other". There are other examples of Tresilian's work in the Chapel which show that things of lesser import had just as much care and artistry lavished upon them.



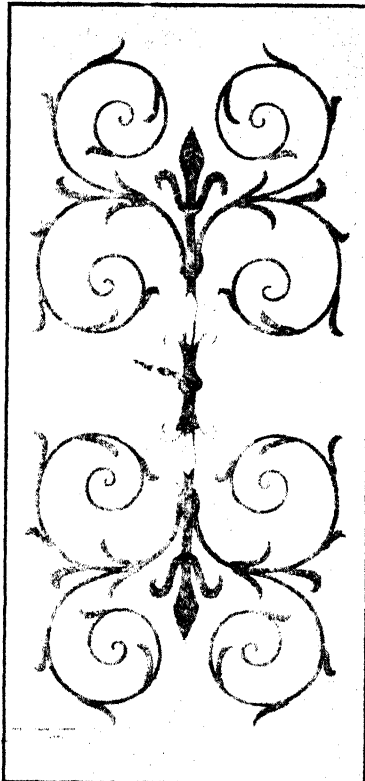
By courtesy of the Ministry of Works.

FIG. 3.—*The round stairs at the Queen's House, Greenwich, by Inigo Jones*

About 50 years before Tresilian's masterpiece, Roger Johnson, a London smith, started to make, in the year 1428, the grille with two gates that closes the Chantry of Henry V. This is built upon joinery lines but shows robust handling. One of the most important of the lesser examples is the Beddington House lock. This bears the Royal Arms of Henry VII. The panels of rich tracery are effected by superimposing pierced sheets. The supporters and small head in the central panel are in chiselled iron in high relief. The general effect is well balanced, although the four panels differ in design. This example dates from the late fifteenth or early sixteenth century, when the demand for Gothic architectural designs was passing. The Guildhall, Boston, Lincs., has some fine examples of provincial locksmithing showing a very high standard of design.

Much fine smithing was put into making the vast number of tomb rails, screens and gates that were such a feature of our churches in the fifteenth and sixteenth centuries. Arundel has the remains of a most successful screen, and examples of tomb rails exist in large numbers although the greater proportion has been swept away. The ironwork of the Urswick Chantry in St. George's, Windsor, is a very good example of the architectural period in its severest manner.

In this brief effort to describe the Life History of English Smithcraft there must



By courtesy of the Ministry of Works.

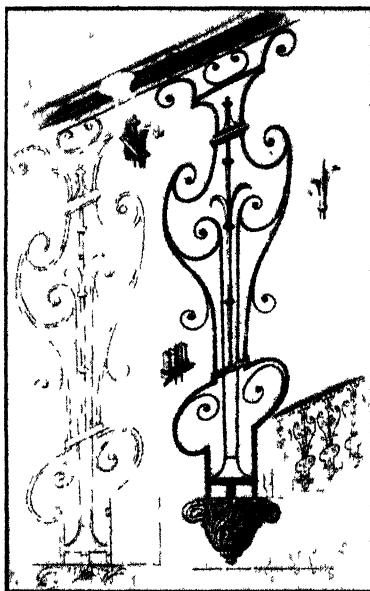
FIG. 4.—Wall anchor, lower half reconstructed
from Gaywood, King's Lynn

be included examples which show how British smiths began to react to the Renaissance influence.

When Inigo Jones installed the iron balustrade in the Queen's House, Greenwich, in 1617-1635, he introduced something quite new in the way of architectural ironwork to this country. It was the result of one of his visits to Italy. The design was not Italian, but in the style and technique prevailing in this country. The ornament is fashioned in iron plate, the welded scrolls and tulips diminishing in thickness towards their extremities. It is this graduation that gives the work distinction which would be quite absent if sheet metal had been used. Other examples in this manner are at Glamis, Forfarshire; and a late but vigorous design

is the Balcony on Guildhall, Guildford, dating from 1683. The Royal Hospital, Chelsea, retains some work in this manner. The railings running at right-angles to the Chelsea Gate entrance have well moulded spikes, and the twisted standards firmly wrought ends. This work was carried out by Partridge under Wren's direction.

Through the Tudors and Stuarts the craft became more and more employed upon the lesser domestic requirements. The lesser smiths had been busy all the time administering to the wants of town and village, but as the craft passed into the twilight of the Gothic tradition these lesser craftsmen were called upon to supply the thousand and one things that the rapidly expanding merchant and yeoman class demanded: latches, casements with fastenings, locks, wall anchors (a Dutch



By Gracious permission of H M. Queen Mary

FIG. 5.—*Marlborough House, Queen's staircase,
wrought iron balustrade*

introduction) and innumerable assistants connected with lighting, cooking and the fireplace. Although showing strong Renaissance influence there was still a whiff of the Gothic about many of them. English smithcraft was at a very low ebb during the seventeenth century and it is quite remarkable that the craft was able to respond so successfully to the great demand that was approaching.

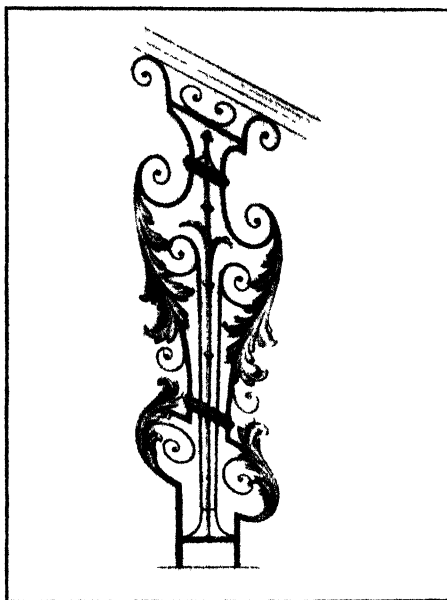
Before we reach this period it may be of interest to regard the efforts of the men who combined artistry with ingenuity in creating the everyday things previously mentioned. The first thing that stands out is that ornament never obstructs usefulness, the purpose of a thing was ever the first consideration.

The manner in which these things were ornamented is of great interest and many useful hints can be collected by examination. The methods are shaping outline, perforation of flat surfaces, incising and, lastly a very important treatment and

one that is singularly neglected to-day, the art of chamfering. To explain this briefly, it is filing the edges of a plate so that it assumes a different superficial outline on back and front. This can be subjected to much variation but it is very easy to grasp the process when confronted by an actual example.

The revocation of the Edict of Nantes had a considerable bearing on the revival of wrought ironwork in this country. Refugees fleeing from France included many artists and craftsmen. Holland received a large number, amongst them Daniel Marrot and Jean Tijou.

These men were highly qualified exponents of the current French taste which decorators and text books refer to as Louis XIV. Daniel Marrot was architect to William III; his father, John Marrot, was, judging by his own engravings, an even



By Courtesy of the Victoria and Albert Museum

FIG. 6.—From No. 12, Charles Street, St. James's, now in the Victoria & Albert Museum

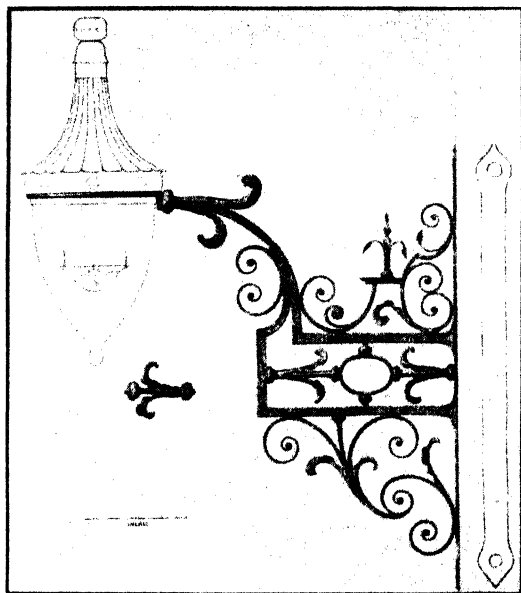
more gifted designer. Daniel's grandfather was a blacksmith, which may account for Daniel's and John's interest in wrought iron as part of their garden layouts. Of Jean Tijou we know little. He came to this country in the wake of the Dutch King and was at once given orders under royal patronage to begin work at Hampton Court Palace in the new taste. He followed on with work at St. Paul's, Kensington Palace, Marlborough House and many City churches and buildings.

It has been suggested that Tijou was responsible for the introduction of this new form of metalwork. It is much more likely that Daniel Marrot and others like him who specialised in designing the many things required in decorating and furnishing the great houses were responsible. Their books and catalogues of engraved designs included wrought iron gates, railings and balustrades. These were circulated

amongst their patrons, fostering the desire to be in the fashion and follow the royal example. So we see a wave of French taste swept over the country completely obliterating what remained of the Gothic tradition. There was no evolutionary process of transition: it was a complete victory to the invading style.

Great credit must be given to the English smiths who, brought up in the Tudoresque way, so quickly made themselves masters of the new technique. Work inspired from engraved catalogues assisted the student smith in grasping the new rhythm with its florid beauty and pure underlying scroll work. But it tended to rob the work of the intimate and personal touch which was such an asset in the preceding style.

Within a few years English architects and smiths had begun to strip their designs



By courtesy of the Ministry of Works.

FIG. 7.—Wrought iron lamp bracket, Admiralty, 1726. The lamp is a 1750 type from Sherborne

of the rich surface sheet work, both leaves and motifs. By maintaining the purity of the scroll work and introducing a more vigorous handling, a style came into being that was pre-eminently British.

To realise the change of taste just described it will be well to glance at examples that demonstrate the process. Two examples of Tijou's work will suffice to illustrate the flamboyant manner as first introduced. The first is part of the ironwork on the Prince of Wales stairs, Hampton Court, twin brackets connected by husk swag which support a balcony at the stair head. They are in the same extravagant manner as the panels of the fountain screen which is accepted as his earliest work in this country. The other example is part of the original altar rails in St. Paul's Cathedral. This shows more restraint, probably by Wren's direction.

During the first years of the eighteenth century, English smiths produced

examples in the same rich manner, a good illustration being the gates in St. Mary Redcliffe, Bristol, made by William Edney of that city in 1710. Embossed acanthus leaves are very much in evidence, but the rhythm is not always quite satisfactory.

That surface leafwork is not imperative to the success of a design is borne out in two examples in the Tijouesque manner that are identical in general make-up, with the exception of the surface ornament. The Queen's staircase balustrade at Marlborough House is quite void of leafwork. The landings and half-landings have panels of balanced scrollwork with each tread filled by a single unit. A similar design of this single panel comes from 12, Charles Street, St. James, but has the rich acanthus ornament mounted on both sides.

Surface leafwork was discarded by English designers during the second quarter of the eighteenth century. The lamp brackets in the Admiralty forecourt (Ripley, 1726) are a good example. Another example in Whitehall is in Kent's Treasury building, 1734. Both gates and balustrade show robust smithing. The latter is of special interest as it shows, as far as I am aware, the first instance of the S scroll being used as a stair panel. The scroll is reversed on succeeding treads, a practice not adopted by subsequent designers who use the S panel facing one way. An example of this type may be seen on the G.R.O. staircase that once served the Royal Academy and the Society of Antiquaries in the north front of Chambers' Somerset House, Strand, completed by Chambers in 1780. Of these two examples it will be seen that all traces of Louis XIVth taste had passed. And it is also important to note that the rococo movement that dominated the Continent during the middle of the eighteenth century was ignored by our craftsmen.

Restraint and delicacy characterised English work towards the end of the century. Influenced by Louis XVIth taste we again produced something of our own which was in time to be covered by that all-embracing term "Adam". The Chambers' Somerset House example shows this new influence in 1780, and there is no better example than Holland's balustrade in the rotunda at Dover House, Whitehall, which dates from 1794.

The early nineteenth century saw the Greek phase becoming more popular. This developed into the English Empire style which was more suited to cast iron than wrought. And so ends the evolutionary process in blacksmithing expressing a national taste.

THE CHAIRMAN: I will now ask you to accord a vote of thanks to Mr. Lindsay, in which I am sure you will all join cordially, for what has been a most interesting, comprehensive lecture. I hope we shall all remember what has been shown to us, all of which was of extraordinary interest. I am sure we all thank him for his excellent paper.

The vote of thanks was carried with acclamation, and after a vote of thanks had been accorded the Chairman the meeting then terminated.

OBITUARY

CLYDE YOUNG.—We regret to announce the death on Tuesday, May 4th, of Mr. Clyde Young, F.R.I.B.A., who had been a Life Fellow of the Society since 1902.

He was born in 1871 and was elected A.R.I.B.A. in 1900 becoming a Fellow ten years later. His more important works included the design for the present War Office building in Whitehall and additions to the Imperial Service College at Windsor and at University College, Southampton.

GENERAL NOTES

THE ROYAL ACADEMY.—Now that the Academy is no longer an assembly of great allegorical pictures, formal state portraits, academic set-pieces, sheep in snow and tired waves vainly breaking, the critic is deprived of those airy generalisations which were always so easy to write and, for all but their victims, so amusing to read. The marked changes in the character of the Academy which have taken place during the past twenty years have been due, no doubt, in some measure to the attitude of the critics, but still more, I think, to the gradual infiltration of original artists from the London Group and other contemporary associations, with the result that any three rooms at Burlington House are nowadays hardly distinguishable from the R.B.A. Galleries, heavy with the works of the New English Art Club. Of course there are still "pockets of resistance" to bold experiment, and certainly many thousands of visitors would feel the absence of such favourites as Russell Flint's incomparably graceful young women, Charles Spence-layh's endearing old men, and Algernon Newton's meticulous records of town and country, to mention only a few hardy annuals.

But the fact remains that the most captious critic is now disarmed by the great variety of works of solid achievement—and it is worth remarking that this year they are of a considerably smaller size than usual.

The President, Sir Alfred Munnings, in addition to his familiar sporting pieces, offers us evidence of wider sympathies and nowhere more engagingly than in a study of his garden under snow, handled rather in the manner of a Claude Monet. The customary place of honour in the Third Gallery is occupied not by one large canvas, but significantly by two, the more important being Dame Laura Knight's dramatic landscape "Sheep may safely graze", which suffers, to my mind, by a too theatrical light. The magic of the lime-lit circus tent has cast a spell over this artist for many years, and it is evident that the fascination is not readily forgotten.

With the possible exception of one of three paintings by the distinguished honorary Academician, De Segonzac, there is no outstanding "picture of the year" in the painterly sense. On the other hand, there is a quite remarkable *tour de force* which will no doubt have achieved the maximum publicity by the time these words appear in print. If J. R. Merton's triple portrait of "Mrs. Daphne Wall" is not a work of art, it is a work of such scrupulous exactitude that one can only marvel at its infinitely painstaking technique. The illusion of reality—or rather, of photographic realism—is heightened by the fact that the artist has employed few tones beyond the range of the camera, and these are painted with the fine stipple brush of the photographer's "toucher-up". Since Gerald Brockhurst departed to America nothing remotely resembling its exactitude has been seen at Burlington House.

Equally popular, no doubt, and more deservedly, will be Mr. Churchill's three exhibits which show a distinct advance on his work last year. "The Goldfish Pool, Chartwell" is a work of genuine accomplishment, with some delicious passages of colour in the overhanging foliage, while the spirited "Blenheim Tapestries" (a more ambitious canvas than the other interior) well holds its own in the main gallery.

For the rest, the Camden Town veteran Charles Ginner, has some characteristically jewel-like pieces, while distinguished low-toned portraits are contributed by Rodrigo Moynihan and Robert Buhler, two of the younger Associates responsible for the leavening of portraiture in recent years. Most notable of the portraits in the academic manner are three pictures by James Gunn, including an arresting figure of the late J. G. Winant posed against a night sky intersected by searchlight beams, an exquisite double-portrait of "Caroline and Louise" by A. K. Lawrence in the style of his great namesake, David Jagger's assured "Captain Cunningham Reid", and Gerald Kelly's head of Somerset Maugham—apparently an inalienable feature of every Academy. Elsewhere paintings by Lord Methuen, Ruskin Spear, Lewis Lupton, Cosmo Clark and Clifford Hall (notably his "Place de l'Odéon, Paris") stand out in a large assembly of works of even quality.

The water colours as usual show an easy confidence of handling, if not a great deal

of invention. Leonard Squirrell's "Brooding Tower, Richmond" and A. E. Davies' "White Sails at Blakeney" are works of rare feeling and accomplishment, and the visitor should not miss an enchanting drawing in sepia, with beautifully controlled washes of colour, entitled "Boats at Low Tide, North Wales" by F. Coulson-Davis.

Sir Muirhead Bone achieves an uncrowded fullness in the impressive sweep of Whitehall seen from the Admiralty, and elsewhere Hanslip Fletcher with an early drawing, and John Farleigh and C. W. Taylor with some delicate wood engravings, claim attention in the Black-and-White room.

Frank Dobson's carefully worked-out Fount in the Central Hall, and Leonard Jennings's exquisite bronze statuette of a Suffolk Punch appeal for various reasons; and of the architectural models and drawings I shall not presume to speak, only reminding Fellows more expert than myself that this year they have an opportunity of judging the plans for converting Carlton House Terrace into the proposed new Foreign Office.

N. A. D. W.

NOTES ON BOOKS

ENGLISH BOOK ILLUSTRATION, 1800-1900. By Philip James. King Penguin Books, 1947. 2s. 6d.

ENGLISH CHURCH MONUMENTS 1510-1840. By Katharine A. Esdaile. Batsford. 1946. 21s.

THE ENGLISH TOWNSMAN. By Thomas Burke. Batsford. 1946. 12s. 6d.

COUNTY TOWN. A CIVIC SURVEY FOR THE PLANNING OF WORCESTER. By P. Sargant Florence and Others. Murray. 1946. 21s.

These four books have one quality in common—handsome production: which means clear type, sufficient margins, well printed plates and serviceable bindings. In these restricted days, reviews tend to be delayed and first editions to disappear; and Fellows may therefore be reminded that these excellent volumes are available on loan in the Society's library.

Mr. Philip James's concise guide to illustrated books from the wood-engraved vignettes of Thomas Bewick to the enchanting illustrations of Caldecott and Kate Greenaway, which captivated us in childhood days, makes one long more than ever for a revival in the arts of the book. One day perhaps—when the warehouses are full of paper, and publishers' offices thronged with decorators—we may realise the truth of Morris's belief that the illustrated book "is not, perhaps, absolutely necessary to man's life, but it gives us such endless pleasure, and is so intimately connected with the other absolutely necessary art of imaginative literature that it must remain one of the very worthiest things towards the production of which reasonable men should strive".

Mrs. Esdaile is the leading authority on English Renaissance sculpture, and her survey of three centuries of English church monuments is a work of patient research for which generations of pilgrims will be grateful. The book, which covers every aspect of the subject from the sources of the various materials to the different types of epitaphs, is prefaced by a long erudite essay by Mr. Saxeveirell Sitwell, and enriched with photographs and drawings of monuments, effigies and engraved brasses. Torrigiani's tomb of Henry VII in Westminster Abbey, and the hearse monument of Alice, Countess of Derby (1636) at Harefield are especially lovely examples reproduced in the book; but scores of others testify to the imaginative craftsmanship of sculptors and goldsmiths, and provide a revelation of the quality and extent of English monumental sculpture.

One can only regret that the gifted author who made his reputation with *Limehouse Nights*, and confirmed it with a handful of books on the pleasures of town and country, did not live to see the choice production of *The English Townsman*. Beginning in medieval times the story is carried through the Stuart, Georgian and Victorian periods to its conclusion with the Citizen of To-day. Admirers of Burke will not need to be told that the story is embroidered with many delightful and unexpected quotations, and the illustrations taken from little-known drawings, prints, paintings and contemporary photographs provide an apt commentary on the text. Boswell would have had no difficulty in

eliciting Johnson's approval of this lively book, Lamb would have rejoiced in it, and one could wish that E. V. Lucas had a copy in Elysium.

Professor Florence's *Survey of the City of Worcester*, undertaken in collaboration with a team of planners, is designed to lay a foundation from which the City's plans for physical and social betterment can be framed. The research group has therefore been mainly concerned with full employment and higher standards of living and working rather than with architecture. Since the problems of Worcester confront at least a score of similar market and county towns in England, it follows that the value of this careful survey reaches far beyond the city. Everyone concerned with local government should have a copy of this practical book within reach.

N. A. D. W.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, MAY 24. Geographical Society, Royal, S.W. 7
5.30 p.m. E. W. Gilbert "The Boundaries of Local
Government Areas."

TUESDAY, MAY 25. Anthropological Institute, Royal,
21 Bedford Square, W.C.1. 5 p.m. Dr F. R. Leach,
"Some Features of Social Structure among Sarawak
Pagans."

Eugenics Society, at the Royal Society, W. 1. 5.30 p.m.
Professor Brinley Thomas "Migration and the
British Commonwealth."

Goldsmiths' Company, I.C.2. 6.30 p.m. Lynton Lamb
and G. I. Friend, "Book Engravers and Metal
Engravers."

International Affairs, Royal Institute, 10 St James's
Square, S.W. 1. 1.30 p.m. Miss Elizabeth Monroe,
"The Interests of the Great Powers in the Middle
East."

WEDNESDAY, MAY 26. Microscopical Society, Royal,
W.C.1. 6 p.m. Dr K. M. Greenland "Principles of
Interference Films used in Optical Instruments."

Photographic Society, Royal, S.W. 7. 7 p.m. Miss
Margaret Haiker "Architecture."

THURSDAY, MAY 27. International Affairs, Royal Institute
of, 10 St James's Square, S.W. 1. 8 p.m. Don ald

H. McLachlan "European Co-operation III: Political
and Military."

FRIDAY, MAY 28. Chemical Society, at the Washington
Singer Laboratories, Exeter. 4.30 p.m. Professor
M. Stacey, "Advances in Immunochemistry."

Engineering Draughtsmen and Designers Institution
of, at the Royal Society of Arts, W.C.2. 7 p.m.
W. E. Waters, "Three-Dimensional Engineering
Drawing."

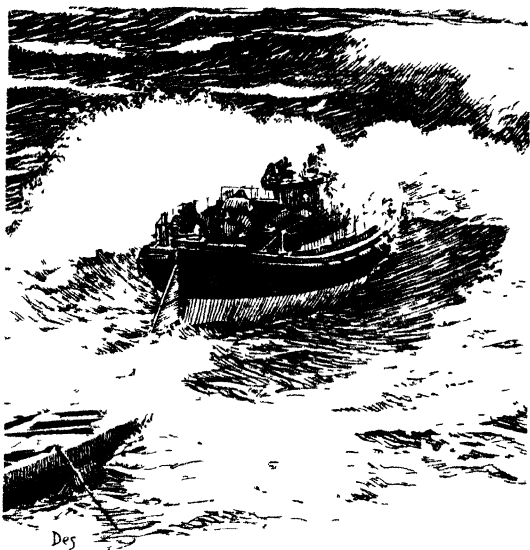
Radio Engineers, British Institution of, at the Technical
College, Coventry. 6.30 p.m. G. L. Hamturger,
"An Automatic Audio Frequency Response Curve
Tracer."

MONDAY, MAY 31. Geographical Society, Royal, S.W. 7
5.30 p.m. "Photo-Canada" (film)

TUESDAY, JUNE 1. International Affairs, Royal Institute
of, 10 St James's Square, S.W. 1. Professor R. G.
Hawtrey "An Economic Policy for Germany."

THURSDAY, JUNE 3. Chemical Society, at the Royal
Institution, W. 1. 7.30 p.m. Professor L. C. Pauling,
"The Modern Theory of Valency."

Electrical Engineers Institution of, at the Electricity
Offices, Taunton. 3 p.m. J. S. Pickles and W. H. Wills,
"Rural Electrification: the Use of the Single-Phase
System of Supply."



S.O.S.

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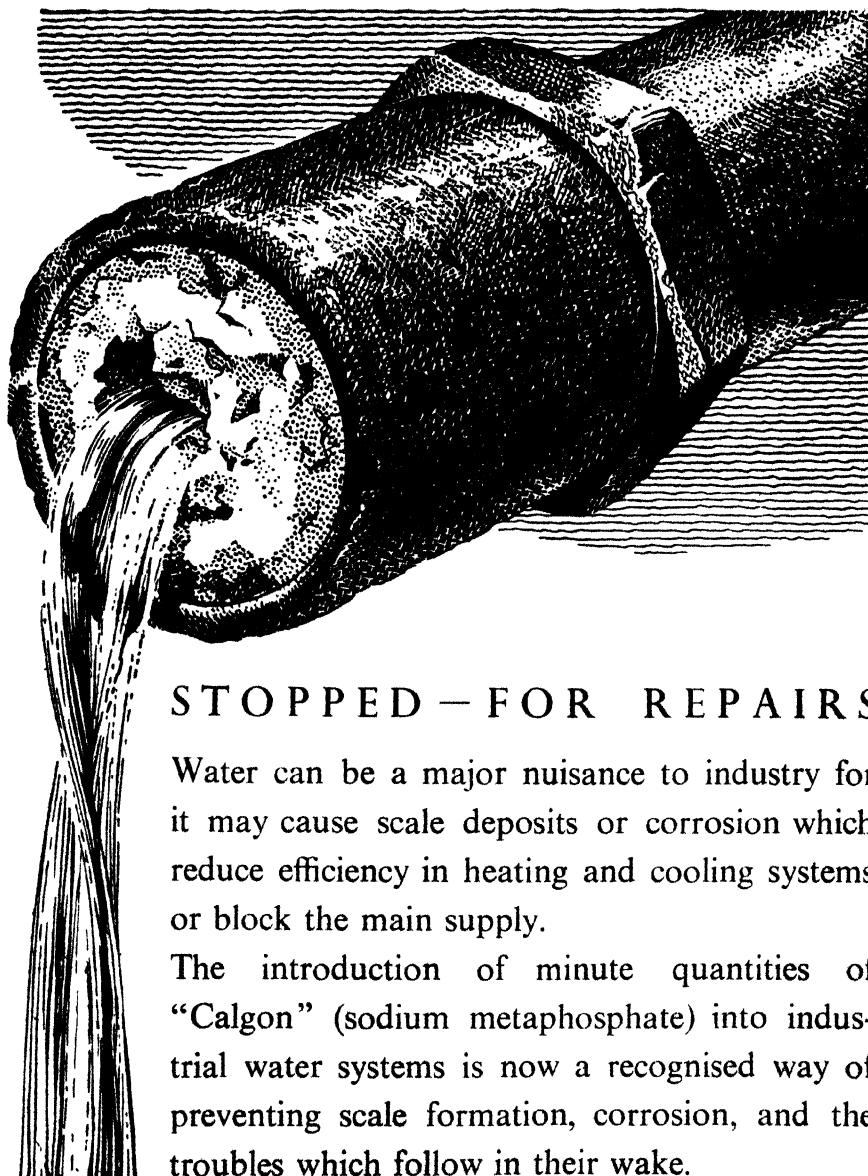
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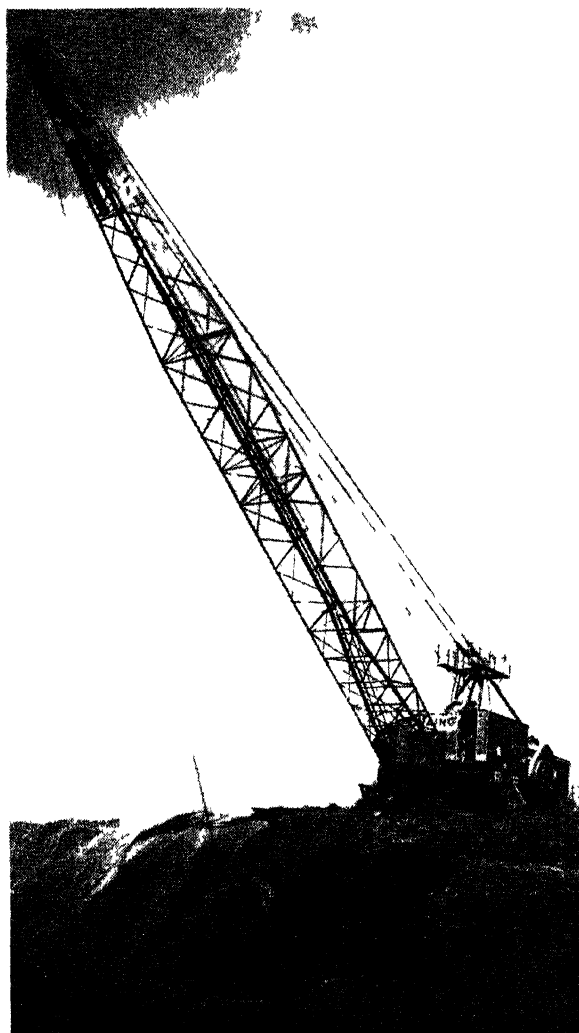
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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4770

FRIDAY, JUNE 4th, 1948

Vol. xcvi

ANNUAL GENERAL MEETING

The Council hereby give notice that the One-hundred-and-ninety-fourth Annual General Meeting, for the purpose of receiving the Council's Report, and the Financial Statements for 1947, and for the election of officers, will be held in accordance with the Bye-laws, on Wednesday June 30th, at 3 p.m., at the Society's House.

(By Order of the Council)

KENNETH WILLIAM LUCKHURST, *Secretary*.



THE NEW DESIGN FOR THE SOCIETY'S SILVER MEDAL

As announced in the last issue of the *Journal* the new designs for the obverse and reverse of the Society's Silver Medal prepared by Mr. Percy Metcalfe, c.v.o., r.d.i., have been approved by H.R.H. The President. Reproductions of these designs are given above. The design on the reverse is based on the original design by Mr. F. H. Andrews, o.b.e., a Vice-President of the Society, which was later adopted as the Society's emblem.

VISIT OF H.R.H. THE PRESIDENT

At the first meeting of the Council of the Festival of Britain, 1951, held at the Society's House, on Monday, May 31st, 1948, Her Royal Highness The Princess Elizabeth attended, as President of the Royal Society of Arts, to welcome the members of the Council. The Lord President of the Council, the Right Honourable Mr. Herbert Morrison, was also present, and the Society was also represented by Sir Harry Lindsay, the Chairman of the Council. A full report of the Princess's visit will be given in the next issue of the *Journal*.

THOMAS GRAY MEMORIAL TRUST

The Silver Medal awarded this year by the Council under the Thomas Gray Memorial Trust to the Candidate obtaining the highest marks in the 1947 examination for the Ministry of Transport Extra Master Certificate has been won by Captain F. G. Merrifield, of Cardiff.

THE EAST AND CENTRAL AFRICAN GROUNDNUT PROJECT

By A. J. WAKEFIELD, C.M.G., B.Sc.

Dominions and Colonies Section, Tuesday, April 20th, 1948

SIR PETER MACDONALD, K.B.E., M.P., *in the Chair*

THE CHAIRMAN: It is my pleasant duty this afternoon to preside at this meeting and to introduce my old friend Mr. Wakefield, who is going to read a paper on a question which is very much to the fore at the moment, namely, the production of groundnuts within the British Empire.

I first met Mr. Wakefield when I was Chairman of a Parliamentary delegation which visited the West Indies when Mr. Wakefield was a member of the Stockdale Development Committee. He was doing magnificent work in that group of colonies as Chief Adviser on Agricultural Development. If any of you visit the West Indies you will hear nothing but praise for the work that Mr. Wakefield did while he was there, in trying to restore agricultural development in those colonies.

Mr. Wakefield has also spent a great part of his life in the Colonial Service in East Africa, where he was Director of Agriculture, and now he is associated with this great Groundnut Scheme. He probably knows more about it and its origin than anyone else. There has been a great deal of criticism of this Scheme, as you know, in the Press and in Parliament. No doubt when you have heard the lecture you will be able to judge for yourselves whether that criticism is justified or not.

I have very great pleasure in introducing Mr. Wakefield.

The following paper was then read:

WORLD POPULATION AND FAMINE

In this talk I want rather to speak both of the inevitability to Britain and, indeed, to the whole world, of such development as the East African Groundnut Scheme and of its effect on Africa, than to spend time over a detailed description of it. This can be obtained from the original White Paper which describes the project, and the subsequent White Paper reviewing the progress made in the first twelve months of operation.*

A few months ago an eminent biologist, who had recently been engaged in a study of the extreme danger of the atomic bomb on the human race, told me he considered that famine was almost equally threatening to the survival of mankind. Because of this he welcomed the East African Groundnut Scheme; the fact that great risks had to be taken, with much haste and improvisation, he considered to be immaterial as compared with the disastrous consequences of mass starvation which must come to the world, unless prodigious efforts were made to develop its potential food producing regions now lying unoccupied and unused.

The first warning as to over-population was given 150 years ago by the English economist Malthus; his famous "Essay on Population" set out to show that population increases faster than the production of foodstuffs, and is only kept in check by war, famine, pestilence and misery. This doctrine was obscured by the

* A Plan for the Mechanised Production of Groundnuts in East and Central Africa Cmd. 7030, H.M. Stationery Office.

East African Groundnut Scheme, Review of Progress to the end of November, 1947, Cmd. 7314, H.M. Stationery Office.

industrial developments of the Victorian era, but, with the turn of the century, the spectre of over-population has returned.

In Asia many millions have died of starvation in recent years. Indians, for example, now average only 12 ounces of rice a day where twenty years ago they had 16 ounces. Even this reduction to a semi-starvation level does not cope with the increase of population; in 1918 there were 300 millions; the number is now 420 millions, and the increase goes on at the rate of 5 millions a year. Not so many years ago Asia exported vast quantities of food, especially oil seeds, to Europe. Now the problem for Asia is to feed her own people, India and China having both become food importers.

Western Europe is also dependent to a large extent on the American continent and Australasia for essential basic foodstuffs, such as bread grains, meat and animal fats. Here, apart from dollar considerations, as was pointed out some months ago in a Parliamentary debate, if drought strikes both North America and Australia in the same year, Britain starves.

The present world population is nearly 2,300 millions, of whom the great majority are far from adequately fed by any reasonable standard, and a large proportion exists on little more than a starvation basis. But when one considers the present rapid rate of increase in world population, the picture is even more grim. Despite war casualties, the increase has been 125 million since 1939, and at this rate world population could double itself within 100 years. Can anyone in their senses imagine that, unless really terrific efforts are made to increase the production of food, famine will not spread throughout the world? Is peace possible under such conditions, with people tending more and more to overcrowd and overflow the cultivated regions of the earth? The most recent authoritative estimate of the world food position asks for 100 per cent. increase in food production during the next 24 years if the world is to provide sufficient for all its inhabitants. Yet the area under food production has declined by several million acres. Britain, where home production accounts for no more than 50-60 per cent. of her requirements, is particularly vulnerable to potential world shortages of foodstuffs.

I consider that Africa too is on the verge of catastrophe. Some of you may have read a paper, "The Human Situation in East Africa", by Dr. Patterson, late Director of Medical Services, Kenya Colony.* His demographical analysis leads to the conclusion that there is a strong likelihood that Africa, like Western Europe 150 years ago, and India only as late as 1921, is on the eve of a gigantic increase of population. Yet even to-day the African people cannot adequately feed themselves. Her people are penned close to surface water supplies; five-sixths of the people of Tanganyika, for example, live on one-sixth of the total land area. The African, with his primitive implements, can never open up the vast tracts of waterless tsetse-infested bush country and establish water supplies; only the technical resources and science of the white man can do that. We must undertake and succeed in such a task or, in Dr. Patterson's words, in East Africa we shall be "left with famine, pestilence, or war for 'remedies'". I firmly believe that a principal remedy to Africa's population and land-use problems lies in the technique of the groundnut project. The process of education alone is too slow.

* Published in the *East African Medical Journal*, February, 1947, obtainable from the *East African Standard*, Ltd., Nairobi, Kenya Colony.

PRODUCTION AND CONSUMPTION OF VEGETABLE OILS

I propose now to deal with fats, the part of our ration that we find the most sadly lacking to-day, and so the *raison d'être* of the groundnut scheme. Although I shall be discussing this question of edible oils and fats mainly from the point of view of food for human consumption, the figures which follow cover the consumption of oils and fats for all purposes; edible and industrial, including soap. As a matter of interest, you may like to know that, before the war, of an estimated total world supply of roughly 20,000,000 tons of animal and vegetable oils and fats, about 3,000,000 tons were consumed in the form of soap.

There is one other point to bear in mind about these figures. There are many different kinds of oilseeds and nuts yielding edible oil. The oil content varies; for copra it is 63 per cent.; for groundnuts 42 per cent.; for soya beans 15 per cent., and so on. So when discussing production and export figures for oil seeds, they are generally reduced to the figure of their oil equivalent, thereby putting different tonnages of different types of oilseed on the same statistical footing.

Up to the time of World War I, the needs of Britain were met principally by butter and lard from our own farms, from Denmark, New Zealand and North America. During the past 30 years, however, there has been a notable increase in the consumption of margarine and cooking compounds made from vegetable oils, the production of animal fats being unable to keep pace with increasing demand. But most oil-bearing plants are largely tropical or sub-tropical, such as palm oil, coconuts, sesame, groundnuts, soya beans and sunflowers. Thus, Britain and other European countries are dependent on imports from the surpluses of tropical countries for a considerable part of their fat rations. Before the war very nearly 50 per cent. of European consumption of oils and fats came from these sources. Britain herself imported as much as 90 per cent. of her requirements, home dairy production accounting for the remaining 10 per cent.

But there is more to it than this. Britain's system of farming over the past 100 years and the home output of milk and beef have been largely dependent on imported oilseeds from the tropics; the extraction of oil from oilseeds and kernels left residual oilcake of great value as cattle feed. Moreover, the manure from cattle fed on imported oilcake concentrates enriched the land for corn production; before World War II the British farmer bought in the form of imported feeding stuffs, partly at the expense of the soil fertility of India and the colonies, at least as much nitrogen, phosphate and potash as he paid for artificial fertilisers.

The recent world war has brought things to a head; partly as a result of increased money incomes due to war expenditure, partly as a result of shortages of alternative staple foods and partly as a result of the general desire of governments to improve the standards of living of their peoples. India is a classic example of the effect of all three of these factors. Before the war, India used to export the vegetable oil equivalent of nearly half a million tons a year in the form of groundnuts and other oilseeds. The 1946 famine conditions there invoked an embargo on the export of oilseeds, particularly groundnuts, and Indian exports of vegetable oils are now about one-fifth of their pre-war level. And though Indian *per capita* consumption is still only in the region of 11 lbs. per annum, total Indian consumption is now greater than before the war, taking into account the increase in population. Manchuria is another

country where oilseeds formerly exported are now retained for home consumption, thereby withdrawing from the world markets another half-million tons of vegetable oil.

Supplies of oilseeds will always remain precarious where they are produced by peasant communities, using the primitive methods of Biblical times, where everything is taken from the land, and nothing put back. Such ways would spell bankruptcy for the British farmer. In the long run it must equally spell ruination for the African. As peasant populations increase, the amount of land which can be rested becomes less and less, and the soil becomes more and more impoverished. Crop yields are then very low and cereal foods become scarcer and scarcer to the point where peasant cultivators can hardly feed themselves, let alone produce for export.

Whale oil, also, has to be taken into account, of course. But even here man has so reduced the whale population that future killings have had to be reduced to an annual quota by International Agreement.

So increasing population in the tropics, the people's demand for better food, soil-impoverishment and erosion, and the dislocation or destruction of plantations due to the war in the Far East, have all combined to cut off supplies of oils and fats which were formerly available to Europe and Britain.

Where, ten years ago, there was a glut of oilseeds, now the shortfall to importing countries amounts to nearly $2\frac{3}{4}$ million tons as compared with pre-war. If we take into account the increase in world population during the war years, making allowance, of course, for war casualties, the world shortfall of oils and fats amounts to close on 4,000,000 tons. This shortage is expected to continue for a decade or more and no material alleviation can be expected except through the restoration of war-damaged sources of supply and the development of new areas of production. For the future, Asia can no longer be depended upon for the export of large quantities of oilseeds, and we are left with Africa and Northern Australia for the development of new areas. And, as a measure of the magnitude of the problem, I would point out that the $3\frac{1}{4}$ million acres of the East African Groundnut Scheme will only product about a quarter of a million tons of oil a year, or roughly half of Britain's shortfall in oils and fats.

POTENTIAL DEVELOPMENT—THE "LARDER" OF THE COMMONWEALTH AND EMPIRE

So far the picture is one of woe. It would indeed be melancholy and grim but for the potentiality which the British Commonwealth and Empire undoubtedly holds to help defeat the threat of world famine. The "Dismal Jimmies" of our own people, together with our detractors and enemies, would have it that Britain and the Empire are finished, instead of which we should just be starting to show what the Commonwealth can do. It will take the application of science, new vision and heroic measures to develop the Empire's natural resources. Of these I know untamed Africa best—the potentiality of her tracts of bush, swamps, lakes and rivers; and recently I have seen something of the tremendous resources of Australia and New Guinea. I can only say, God help civilisation, East and West, and Africa too, if we fail to make good and permanent use of them. The Plan for the Mechanised Production of Groundnuts in East and Central Africa, tremendous as this is, can only be regarded as a modest beginning.

The history of the groundnut project is this. When Mr. Samuel, Managing Director of the United Africa Company, an associate of the Lever Group who have extensive palm oil plantation and trading interests in West and Central Africa, was in Tanganyika early in 1946, he considered the possibility of a small development, if the company could get some suitable land, for the mechanised cultivation of ground-nuts. On his return home he was immediately faced with the realisation of the critical long-term situation in oils and fats which could, it was apparent, only be rectified by rapid and large increase of annual seed crops. Mr. Samuel therefore abandoned the idea of the small development by the company, and proposed a very large-scale development by Government. Accordingly he prepared a brief paper which was submitted to the Ministry of Food and the Colonial Office.

At the instruction of the Cabinet, a Mission, of which I was a member, was despatched to Tanganyika on the 20th June, 1946; our investigations were extended to Northern Rhodesia and Kenya, at the request of the Governors of those territories. We returned to London on the 3rd September, and reported by the twentieth of that month in favour of the Samuel Plan. The fat position was so serious that, despite the tremendous difficulties and the risks involved, the Cabinet quickly approved the whole scheme, and steps were taken before the end of the year to put it into operation.

H.M. Government decided that the project should be operated by a Public Corporation. To this end the Overseas Food Corporation was recently established under the Overseas Resources Development Act—the Bill being supported by all parties in the Houses. But the urgency was so great that the project could not even await the enactment of the necessary legislation to establish the Corporation; neither were Government Departments geared to undertake that kind of development. In order that operations might start without delay, the United Africa Company was therefore invited in November, 1946, to start the project as Managing Agents to the Minister of Food until the Corporation took over at the beginning of March. The responsibility placed upon the United Africa Company was a heavy one, but they accepted it as a challenge, as most of those concerned with the scheme have done. It was not only the United Africa Company; the whole weight of the world-wide Unilever Organisation has been directed, wherever required, to the service of the scheme. Without this and the business experience which Unilevers brought to bear, I cannot imagine how the difficulties of procurement and supply could have been surmounted.

The intention of the scheme is to clear and bring under cultivation a total of $3\frac{1}{4}$ million acres, or 5,000 square miles of virgin bushland, principally in Tanganyika territory, but also in Northern Rhodesia and maybe Kenya too. Some idea may be gained of the magnitude of the task by imagining what it would mean if almost the whole of Yorkshire, which is 6,000 square miles in extent, were moorland and forest, and this had to be completely cleared and brought into a fit state for farming in the course of the next 5 years or so. East Africa presents far greater difficulty, for Tanganyika is not an industrial country. The railway is a single track; the port of Dar-es-Salaam has no deep water berths and everything must be unloaded from ship to lighter; no suitable port exists in Southern Tanganyika, and one will be built there, together with a railway, and in the areas for groundnut development there are no roads. Houses for Africans and Europeans; tractor and vehicle repair and servicing shops;

factory installations; water supplies and hospitals—all have to be built. What must be achieved before the full 3½ million acres mechanised farming programme can be put into operation is quite staggering—the faint-hearts may say it is impossible. Let the British people ask themselves if, because of the odds, the task in Africa should be shirked, when there is no other apparent way of feeding themselves adequately.

AFRICAN INTERESTS

There is no doubt that this development is giving anxiety to many people who are sincerely concerned about the consequences for Africa. They feel we may be exploiting either the people or the land of Africa solely for our own benefit. Let us get this straight—I speak now as a Colonial, for I worked for 25 years in East Africa and the West Indies, and finished my official service with the Colonial people fearful for their future. Until the Samuel Plan was produced, I could see nothing but famine, riots and revolution lying ahead. So much was said of the necessity for providing an economic basis for social progress and political advance; but little or nothing was happening apart from a general political awakening in Africa. Two wars had broken down African feudalism. Soil-erosion and population increase were lowering even the present subsistence standards.

The most frequent more or less informed criticism of the Groundnut Scheme is on the lines of “if Africa is moving towards a food crisis like India’s how will the production of food for export help? Surely in a few years the Africans will be needing food for themselves”. The answer to that in its narrowest sense is, firstly, that it is only by the technique of the Groundnut Scheme that the 3½ million acres concerned can be brought into cultivation at all, and, secondly, that the intention is to develop the cereal sorghums as a rotation crop with Groundnuts, and if we are successful in that, two or three hundred thousand tons of grain would be available for local consumption if need be. In its broadest sense, however, the value of the Groundnut Scheme to Africa will be in the trial and development of methods and machinery for the clearing of bush and the cultivation of land, which if successful could be extended *ad lib*. In fact, I am convinced that the condition of the densely populated areas around Lake Victoria is such that the governments concerned would be forced sooner or later to embark on some such project solely for the production of food for local use.

The indications I have given of the serious condition of African native agriculture is more than confirmed by the dispatch dated March, 1946, of Sir Philip Mitchell, Governor of Kenya, to the Secretary of State for the Colonies, which is extensively quoted in the White Paper. He considers that “primary production by African peasants in the manner in which it has hitherto developed is already on the decline”, and that on this basis there “is a severe struggle to maintain the existing very inadequate standard of living”. It is moonshine, he writes, to think otherwise, and emphasises: “There have accordingly to be found, if there is to be any real rise in the standard of living, alternative forms of economic activity where these do not exist already, together with measures to enable the African cultivator in appropriate cases to break away from his economically weak and primitive form of cultivation

without capital or mechanical aids. Where this cannot be achieved no amount of benevolent assistance for social services can avail to improve the lot of the people"

He refers to the "heavy task before his Government in spreading knowledge and understanding of the extremely difficult problems involved" and that "even so it is hardly to be expected that many (Africans) will be convinced, at any rate before ocular demonstration in the form of successful settlement of new land and rehabilitation of old is available". The White Paper concludes its extracts from this dispatch with the words: "It is the hope of His Majesty's Government that the Groundnut Scheme will prove that ocular demonstration".

Some imagine that the African is being deprived of land, whereas almost all the land of the groundnut areas is virtually uninhabited, and likely to remain so in its present state, because of the absence of surface water for domestic purposes. As things are, dense populations of East Africa are constricted around the great lakes and rivers. They cannot expand into the uninhabited waste lands until water is made available by boreholes or reservoirs. But these require heavy capital expenditure, and it is quite uneconomical to provide them on the present extremely low level of African production.

Then there is tsetse, which infests about three-quarters of the groundnut areas in Tanganyika. Although some varieties of this fly can be eradicated at little expense by selective clearing of thickets and riverine forest, there are vast regions of "miombo" savannah forest which must be completely cleared to eliminate the fly. But an official review of practical methods of tsetse control published just before the Groundnut Mission in 1946, concluded there was no economic basis for the wholesale clearing of miombo bush; even spraying from the air with DDT or Gam-mexane is out of the question except for circumscribed areas. So that it seemed as if tsetse would remain in undisputed command of great tracts of land. But this will be changed by the development of the groundnut areas; 2,000,000 acres will be cleared of tsetse and gained for Africa.

THE FULL MEANING OF THE SCHEME.—LONG-TERM OBJECTIVES

Fears have been expressed that land developed under the scheme will become permanently alienated, and complaints have appeared in the Press of this country that no official statement has been made regarding African interests. But the ultimate aim of the project is described in paragraph 17 of the White Paper, presented by the Minister of Food to Parliament in February, 1947. It is so important that I will read it *verbatim*:

"His Majesty's Government recognise that it would be objectionable to place the management and development of large areas of these African territories under the permanent control of an organisation from outside the territories. Their intention is therefore to arrange with the Governments concerned that the undertaking should be transferred to them at a time and on terms to be agreed in the light of experience of the working of the project. This is envisaged as a step towards the more distant goal of transferring the control of the undertaking to the people themselves, possibly on some co-operative basis which

would ensure continuance of the full benefits of large-scale mechanised and scientific production”

Then there are the objections of those who dislike seeing the African “westernised”, and so spoilt in our view. We have yet to realise that, as with any other race and nation, the African himself will decide his destiny. Even now many of them refuse any longer to be kept in a state of picturesque antiquity, with its background of insecurity and misery. Scores of thousands have flocked to the towns where their roots are completely severed from the land; the Groundnut Scheme, even with its mechanisation, will not do that. It will not, as some fear, entirely destroy African village life; no more than one-sixtieth of the whole population will be affected. There is nothing novel in the employment of Africans from tribal villages; over 300,000 already work for wages, whereas about one-tenth of that number will be permanently employed on the Groundnut Scheme.

Our aims and methods of labour employment, however, will be new. We do not want a migrant labour force, with men leaving their families behind in the villages and returning to their homes after six months or so of plantation work. Model villages will be built by new methods of house construction using local materials; it is not costly, and may revolutionise housing in the tropics. We want the married men to bring their families with them, to regard the groundnut units as their homes and to have the feeling that they “belong”. This is essential to our operations, for, with such a highly mechanised project, practically all our men will come into skilled categories. Also the ultimate stage of African management and operation of the project will depend on skilled and trained African staff, and most of all on the emergence of African leadership. So often one hears of the lethargy and absence of ambition of the African, and the apparent failure to “strike the spark”. That in itself is a challenge, which I, personally, feel will be met in time on the groundnut villages.

Dr. J. Welch was appointed as Director of Education and Social Welfare at the beginning of the year. He is a trained anthropologist, and has done pioneer educational work in Nigeria. He will work in close collaboration with the local governments, especially with the Education and Social Welfare Departments of Tanganyika. It will readily be seen that the all-round education (using the word in its fullest and not merely formal sense) of some 60,000 Africans, permanently settled, we hope, on farms covering an area nearly the size of Wales, and coming from more than thirty different tribes and speaking different languages, must present special and difficult problems. But the premise from which education must start, if we are to implement the charge laid on the Corporation by the White Paper, is the undertaking to hand over the Groundnut Organisation to the Africans when it is possible for them to accept that responsibility. The African will not be ready to accept it without proper education directed to that end.

Education may, therefore, fall under four headings:

(i) It is urgently necessary for communication among the African employees and between African and European, that we should find a *lingua franca*. Swahili is spoken by only a minority of the Africans now employed; and Swahili is a language deficient in technical phraseology. We are starting mass education in Basic English adapted to the needs of the African and his daily life and work on

the groundnut units, and using visual and aural aids. This work, which is being done in collaboration with the Fundamental Education Panel of UNESCO, is in the hands of Colonel Myers, who was responsible for teaching Basic English to Indian troops. The results of his work will be made available, through UNESCO, to similar language teaching campaigns throughout the world.

(ii) A Director of Technical Training has been appointed; he is concerned not only with training skilled artisans and other workers, but also with teaching about the purpose of the project.

(iii) The education of children and adults. Those who know African village life at all intimately will realise some of the problems we shall meet in creating new village communities of Africans from many tribes, and on land never inhabited by the tribal ancestors. It is certain we shall need a focal centre around which can be grouped the many activities and interests of the community.

(iv) Our greatest educational task will be that of finding and educating leaders, men and women who should be ready in course of time to help with the take-over on a co-operative basis.

On the welfare side the people themselves must be guided to organise and control village life on the groundnut units through their own elected agencies. We must also provide against the effect of boredom produced by security of food, shelter and life in general, as compared with the strain and excitements of their tribal villages, such as the fears of drought and failure of crops, the threat of locusts, game hunts and so on, all of which provide emotional outlets. We believe that a spirit of self-reliance and a full and interesting life can be developed by encouraging such movements as 4-H clubs, agricultural societies, women's institutes, as well as recreational clubs.

In regard to religious activities, among peoples who include Christians, Mohammedans, animists and also secularists, full opportunity will be afforded for the development of religious life, as well as complete freedom of worship. The religious problem presented is obviously a great challenge to the religious bodies concerned. The challenge has been seen and is being accepted, and co-operation with religious bodies has been established.

On the medical side we have reason to be proud of the Health Service already built up by Colonel T. Woods, who was seconded to us by the War Office. Ultimately this will bear comparison with that of any rural community in any part of the world. The emphasis is on the prevention of disease whereby malaria, dysentery, and other endemic tropical diseases should be eradicated. We feel that such a service is due both to the Africans and Europeans engaged on the scheme. It may seem expensive in the early years, but I am sure will pay a handsome dividend.

CO-OPERATION WITH EXISTING INDUSTRIES

There is an understandable fear among established industries in Tanganyika that the Groundnut Scheme will deprive them of labour. Obviously it would be nonsense to establish a new industry by destroying another, particularly if the commodity concerned is essential not only to the local economy, but to food production and for earning dollars, which is the case with sisal. It is equally clear that

the impact of the Groundnut Scheme on the local economy must be severe in the early years, when clearing and port and railway development are being carried out.

It is important to know that no one has ever denied that ample man-power exists. The total available manpower in the Territory is $1\frac{1}{2}$ millions, of which only 325,000 are gainfully employed for wages at the present time. It should be significant that, whereas 80,000 Tanganyika Africans joined the Forces without detriment to production for export, the total number of Africans to be permanently employed on the groundnut units in Tanganyika will be no more than 25-30,000; capital development will require another 50-60,000, the peak being reached in three years' time.

Personally, I believe that if the Africans want a better way of life they must work for it, the same as everyone else. I am in no doubt that if conditions are right, housing and good food are provided, and the African can live with his family where he works, he will respond. They will never thank us if we keep production geared down to the present level; we must see to it that, both as individuals and as a race, they will benefit from greater effort.

SCIENTIFIC ASPECTS OF AGRICULTURE

Coming now to the land, there is no intention of mining the soil of the groundnut units or of permitting it to become eroded. A leading soil conservation expert has been engaged from South Africa, and from the very start of clearing, operations are planned and carried out on a regional basis to conserve soil and water. Soil chemists and soil surveyors are at work, and where plant nutrients are found to be deficient these are being added, and the minerals taken off the land by cropping will be replaced by fertilisers. Lime factories are being built, and the possibility of utilising local phosphate deposits is being investigated. Two geologists are engaged in surveys of local resources in respect of other fertiliser deposits, as well as for building material and underground water. Grass leys are included in the rotation to improve soil structure and to add organic matter to the soil. All these, and much other scientific work must be done if crop yields are to be raised at reasonable cost to a level which can carry the overhead capital costs, by methods which improve and do not destroy soil fertility.

In regard to supplies of machinery and equipment, these have not been obtained at the expense of British agriculture. A Canadian firm has stepped up its output to meet the especial needs of the Scheme; at the same time the door is open to British manufacturers when home demands for farm equipment have been satisfied.

As to existing Colonial production, the question has been put in Parliament and elsewhere why this new effort in East Africa should be undertaken when 100,000 tons of groundnuts were lying up-country in Nigeria for lack of railway transport. It was thought that rolling stock and engines were being diverted from the west to the east coast of Africa. There is no truth in this—not one single engine or wagon has been diverted from the west coast to Tanganyika—in any case, the gauges of the two railway lines are different.

DIFFICULTIES OF INAUGURATION

The target for the first year's plantings, as given in the Mission's report, was 150,000 acres. But the amount actually cleared was only about 13,000 acres, of which

planting was limited to some 7,500 acres, including certain adjacent rather heavy grassland. Because of this some people fear, others for some peculiar reason appear to be glad, that the scheme may fail. I must make it quite clear that we of the Mission were asked, if we found the mass-production of groundnuts to be practicable, to put up a plan for an output of 500,000 tons of groundnuts within five years—the seriousness of the fat position was so urgent that the effort had to be made if at all possible. We prepared our schedules accordingly, but emphasised that *if the targets were to be reached in the given time, it must receive equal treatment and determination as was given to major operations in the war.*

In fact this proved impossible. It is true that all Government Departments, both in this country and in Tanganyika, did all they could for the project; but in no way was it possible to deal with our needs on a war-time footing. Defence Regulations could not be invoked for priorities or anything else. Priorities indeed were small—the Project had to take its place in the queue for shipping, and we had to go into the open market for special charters of ships and planes. Lease-Lend was at an end, and the world had to be scoured for secondhand, sometimes war-torn tractors and so on. We could not encroach on supplies to essential industries, such as open-cast coal mining. In recruitment of personnel care had to be exercised not to curtail the re-building of the Colonial Services; or to interfere with the newly-formed National Agricultural Advisory Service; or to poach on industrial and commercial enterprise in Africa. In no way could we ride roughshod over other interests to get what was required.

The Mission considered that if its 1947 target was to be achieved, the right kind and quantity of supplies should be on site by February of that year. All calculations were quickly upset, however, by the arctic weather and fuel crisis of early 1947, which delayed shipments from the United Kingdom by two–three months. Other obstacles cropped up. Even though dollars had been plentiful new heavy tractors and tree clearing equipment were hard to get. The second-hand tractors which had to be taken had efficiency certificates of a 95 per cent. “life”, but they repeatedly broke down after lying unused for so long; spares were difficult if not impossible to get; African ex-servicemen had forgotten their war-time mechanical training; despite magnificent effort the Tanganyika port and railway services could not always cope with the extra traffic. All this and a host of other difficulties are gradually being overcome by the determination of the men on the job. With regard to the Africans they are now doing splendidly with heavy tractors and agricultural machinery.

But let us be frank—our greatest deficiency has been in the requisite know-how in dealing with different root systems. Engineers who had cleared forest and moved earth for military installations in war found there was much more to it when it came to preparing land for farming. Unfortunately, the mesquite type of bush in the Kongwa area which had to be tackled first, instead of last as recommended by the mission, although looking easy enough above ground, has a very nasty mass of roots quite different from the vegetation of the other groundnut localities, which had been successfully cleared previously. It took time to determine the best kind of implement to do the job, and serious delay then occurred in getting the number required.

You may ask why take on land so thickly covered with bush. The answer, as far

as East Africa and, as I also recently saw, Queensland is concerned, is that groundnuts require a light friable soil, and this, with adequate rain, is bound to be under some form of forest growth in its virgin state. Where open natural grasslands exist conditions are unsuitable for groundnuts—they get waterlogged in the rains—and they are not suitable for tree growth either. In short if we are to make up the deficiency of vegetable oils the clearance of virgin forest cannot be avoided.

The greatest disappointment has been to the Europeans who had sweated and worked day and night on the project. In maintaining the high targets a number of bottle necks were broken through; but we were asking much of our men who, Africans and Europeans alike, are still living under canvas. If one takes into consideration the hard pioneering conditions they have endured in the first year, I doubt whether any body of men have done more in post-war service for this country than our "Groundnutters".

If the first year's achievements were to be measured solely by the acreage planted, the results would be discouraging. Such an inference would be wrong, since it would ignore the achievements of the first year's operation. Time does not permit of an adequate description of these. Briefly they are: the acquisition of war surplus heavy clearing equipment and other materials which would no longer be available in later years; the adaptation of war-tanks to tractor work, and British development of new clearing equipment; the surveys and work on port and railway in the Southern Province of Tanganyika and the building of a 17 mile branch line in the Central Province; the sinking of water bore-holes; the recruitment of operating personnel, scientific and medical staff of a high calibre from this country and South Africa; and all that goes with the general establishment of a huge organisation. Also, during the year problems have emerged, and so can be tackled, which were previously unknown or at least could only be guessed at. Most important of all is the experience gained for future operations.

It is permissible for me to say a few words about the Mission's planning of the scheme. We sought out and consulted a wide range of authorities, including planters and farmers, from Kenya to Southern Rhodesia. From the point of view of the development of Africa the scheme was generally given a hearty welcome; only one or two doubted if it could work. Our estimates of clearing costs were not guesses; they were based on actual costings, figures of clearing work for the major planting industries in East Africa. The Ministry of Food sent one of our members, Mr. David Martin, together with a machinery expert from the Ministry of Agriculture, to the peanut growers of the U.S.A. where the crop was mechanised and a good deal was harvested by combine. Authorities in the United Kingdom were consulted; their main criticism, with which I agree, was that we had not paid sufficient attention to the weed problem. Before operations began I went to the Transvaal where groundnuts have been successfully grown on a large scale for several years consecutively. Recently I visited the principal peanut growing area in Australia at Kingaroy. We found nothing to warrant any immediate change in the proposed agricultural operations. Nevertheless, we do not regard these as a rigid formula. Form of cropping and rotation will be revised according to the results of our own research work, as well as organisation and planting experience. This goes for the size of the unit, as it does for anything else. It will be impracticable to introduce

cattle for some years; water supplies must first be assured and foundation stock obtained.

CONCLUSION

For my part there is nothing that I have seen or heard, and no disappointment of the past year which causes me to waver in my belief in the undertaking. From its very inception the Scheme has been a challenge; we have encountered severe criticism; faced set-backs that were almost heart-breaking at the time; met and surmounted innumerable unforeseen difficulties in the African bush. The challenge has been accepted by all who have had their part to play in the Scheme, with an almost passionate faith in its aims and its ultimate success.

I would now like to refer to the final paragraph of the White Paper. In this clear statement lies both the kernel of the Scheme, and Britain's acknowledgment of her dual obligation as trustees for a great part of Africa and its development for the benefit of mankind in general. It reads:

"In arriving at their decision, His Majesty's Government have been greatly influenced by the obligations which they assumed by their acceptance in 1943 of the resolutions embodied in the Final Act of the Hot Springs Conference, and by their active participation in the Food and Agriculture Organisation of the United Nations. His Majesty's Government are convinced that in present conditions this responsibility can best be discharged by taking early action to increase the world's food supplies. If this large-scale experiment succeeds, it may well prove to be an important step towards the Food and Agriculture Organisation's goal of a world freed from want".

DISCUSSION

Sir HARRY LINDSAY, K.C.I.E., C.B.E.: I do not want to anticipate the vote of thanks which the Chairman will propose to the author at the end of this meeting, but I should like to say how greatly we have enjoyed the paper and how beautifully balanced it is. The author started with the broad world aspect of word requirements; then he came down to the details of the Scheme; and he concluded by again referring to its general aspects. It was quite impossible for him to cover the whole ground in the short time available, and so there are one or two questions of detail that I should like to ask.

A priori there were no convenient water supplies in the area covered by the Scheme, and I should like to know what has been done to remedy that defect. Has it been remedied by surface irrigation or by artesian wells, or has the water deficiency been corrected in some other way? I think the audience would be interested to have information on that point.

The labour force engaged in the Scheme will require cattle for subsistence and also, presumably, for subsidiary ploughing and transport operations. *A priori*, again, the country was subject to tsetse. The destruction of the bush will have destroyed the home of the tsetse and will therefore have helped to clear the area from the tsetse. Are any supplementary measures necessary in order to ensure complete immunity from the tsetse menace in future for men and cattle?

Mr. WAKEFIELD: Water supplies are being provided by boreholes, and I think that on the whole we have reason to be satisfied with the success achieved with them.

With regard to the labour force and cattle, the area cleared will be so great that I do not think any particular measures will have to be taken to keep tsetse out, except probably smoke fly-clearing sheds and inspection pickets, at the entrance to the groundnut locality, to see that the lorries and bicycles, and so on, do not carry the flies inland. But even when we have got the area clear of tsetse we shall not be able to keep cattle until we have

sufficient water. We have first to get enough water for our labour force and for all the capital developments, building and so on, and I think it will be two or three years before we can begin to bring in any cattle.

Sir JOHN WADDINGTON, K.C.M.G., K.C.V.O.: I wonder whether the author could give us any indication of when the Scheme may be started in Northern Rhodesia. I ask that question for two reasons, and, as I can state those reasons in a very few words, perhaps I may be allowed to mention them.

First, I regard the Scheme as most important for the economy of Northern Rhodesia. The Scheme is primarily one to solve the world's food problem, and that must remain its primary object, but we must recognise that the proper economic development of the Central African territories is of great importance not only to those territories themselves but also to the Empire as a whole. That aspect of the Scheme must be kept well in view.

Secondly (this is a more important reason and has been referred to in general terms by the author), there are large areas in Central Africa which are capable of agricultural development for crops other than groundnuts, and Central Africa can, I think, become a granary of great importance. Two things are necessary for that, namely, proper communications and a complete change in agricultural methods. I look to the Groundnut Scheme to provide the economic justification for the improvement of communications and, secondly, to provide the experience whereby there may be what I might call a revolution in agricultural methods. I feel that with that revolution in agricultural methods we could have large crops of cereals and rice produced in areas in Central Africa which at the moment are producing nothing.

Mr. WAKEFIELD: I remember that we had not been in Tanganyika very long before Sir John Waddington dragged us down to Northern Rhodesia! Whenever I am asked why we did not go to Uganda or elsewhere outside East Africa but went to Northern Rhodesia, I reply: "Because Sir John Waddington asked us to go there". I am as anxious as he is to get the Scheme started in Northern Rhodesia. But we cannot divert our energies to any serious extent from the first "battlefield" in Tanganyika. A working party is, however, going to Northern Rhodesia in June to check up on the considerable amount of preparatory work that has already been done there, and it will be on the report of that working party that further plans will be made. I am afraid I cannot say more than that.

I agree with Sir John about the potentialities of Northern Rhodesia. If one walks or rides through the country, or even flies over it, from Ndola, past Lake Bangweulu, on to the southern highlands of Tanganyika and down through the Kilombero valley, one wonders why the world is short of food and makes one feel that it serves us right so long as the development of such areas is neglected.

Mr. ALAN WALKER: I have greatly enjoyed the paper but there are two points I should like to raise.

I had hoped that the author would deal with the question of the total amount of money involved in the scheme. Could he tell us how much of the £23,000,000 is really capital expenditure, and secondly, could he give us a very rough idea, based on the value of groundnuts to-day, of what the return on capital is likely to be averaged over the next ten years?

Mr. WAKEFIELD: The Mission's estimates were a total of £23,900,000, and of that sum the capital expenditure is given as £12,415,000. The last figures published were those given to Parliament in the Progress Report in 1947. I do not think there is anyone to-day who can say exactly what the cost will be. This is our first year's effort. We have yet to get experience. We have to train African drivers. A good deal has been said about expenditure. The last figure given, I think, was approaching £8,000,000. The criticism has been made that the expenditure according to the White Paper was £2,500,000 for the first year's operations and that 150,000 acres ought to have been planted, whereas only 8,000 acres were planted and nearly £8,000,000 had been spent, and so, the critic holds, the whole project has cost £1,000 an acre. Obviously that is nonsense. The people who have put it forward have not taken any notice of what was said in the Progress Report which was given to Parliament, in which attention was called to the fact that the greater part

of the expenditure was capital expenditure, a good deal of which has been spent on purchases of tractors which will be used over the next five to seven years, and on railways, the new port, and so on. As to the Mission's estimates, I said earlier that the costs of clearing were based on actual experience in East Africa, but it is certain that for one reason or another they will be higher. You will remember, however, that a very big margin was given in the White Paper: it was reckoned that the f.o.b. cost of production would be about £14 a ton, but I do not suppose that groundnuts can be bought to-day at less than £40 a ton.

THE CHAIRMAN: I should like to propose a vote of thanks to the author for his very interesting and instructive paper. As he said, I have supported the Groundnut Scheme from the outset, not only because it is an instrument for the production of edible oils and fats, which are so much needed to-day, but also because I have always believed in the development of the Colonial Empire. I wish that when people look at the Scheme they would look at it from that point of view. The author has read extracts from statements made by no less an authority than Sir Philip Mitchell, who has a great knowledge of the Colonies. He is now Governor of Kenya and one of the most progressive Governors in the Colonial Empire, and what he says is well worthy of consideration. The upshot of it is that, unless a scheme such as this Groundnut Scheme is carried out in the next few years in East Africa, famine, starvation and pestilence will be rife in that territory. I have seen the East African territory and I have seen something of what goes on in the way of soil erosion, and I know that that statement is a fact. I have also seen, both from the air and from the ground, the enormous areas of forest where no human being or animal exists, because they are infested by the tsetse fly. If the Groundnut Scheme will cause new areas to be opened up and the tsetse and other pests to be cleared away, it will be well worth the cost, however much may be spent on it, because not only will it provide foodstuffs which are essential to Britain but it will also bring about the development of the Colonies in question and enable their people to survive.

That which applies to East Africa applies equally to most of the other parts of Africa. I have spent the last three weeks touring one of our greatest Colonial territories, Nigeria, and there is under-production there also, people living at and sometimes below subsistence level. In that territory, which is not nearly so thickly populated as East Africa, we shall find the same problems in a few years' time, due to soil erosion, unless great developments take place.

I have noticed in my career in politics that any development that is undertaken in the Colonial Empire is criticised and people are inclined to put it on a pounds, shillings and pence basis. We need to-day people with a broader vision and people who are prepared to take a long view of Colonial development. If we take that view of it, I am quite convinced that we shall all agree with the people who are responsible for the Groundnut Scheme and give them every support, instead of criticising and discrediting the Scheme, as is done in very distinguished papers every day.

The vote of thanks was accorded with acclamation, and after a vote of thanks had been accorded the Chairman the meeting terminated.

DISTRICT HEATING

With special reference to the Combined Generation of Heat and Electricity

By HY. S. HORSMAN, M.I.MECH.E., A.M.I.E.E., F.INST.F.

MR. ALFRED C. BOSSOM, F.R.I.B.A., M.P., *in the Chair*

THE CHAIRMAN: I think that we are going to have a paper this afternoon on an exceedingly interesting subject, and one which I feel is particularly important at the present time.

I assume no one would disagree that England needs to be about one-third rebuilt.

That is a tremendous lot of building for any country. We only have one raw material, which is coal, and we all know we need a lot more of it. If we had more of it available at this present time our economic position, which is decidedly precarious, would not be in such jeopardy as it is.

Our population is remarkably large for the size of our country. Figures have been produced, I think in the Barlow Report, which show that to-day England is more densely populated than any other civilised area, and most of our population make use of open fires.

What is the result of that? To begin with it is certainly expensive. Secondly, it pollutes our atmosphere, and it is not good for our health. Reliable investigations prove that if we could eliminate the filth which comes from all these open fires or chimneys of every sort, the health of the community would definitely improve. Laundry bills would be materially reduced. I believe that if we could cut out all this foul ingredient which gets into our atmosphere, laundry bills and other charges for cleaning would be reduced by about two-thirds.

Another limitation under which we exist applies to us more than to any other country in the world. The Gulf Stream flows about our shores and makes our atmosphere more heavily laden with dampness than that of the United States and of Russia, because those countries do not have this same influence affecting them.

District heating, the subject of to-day's lecture, has not been much adopted here, yet I remember that even at the end of the last century the New York City Steam Company was quite active. If you go out to the far west of the U.S.A. you find that steam heat and hot water can be turned on in the same way as electricity and cold water can be in most of Great Britain's developed areas. Such heating means a great saving, and it is a pity we have little of it in this country.

I know we shall hear a clear statement of this modern scientific treatment, its possibilities and what is done by means of it elsewhere, from Mr. Horsman, who is a member of the Institution of Mechanical Engineers, an associate member of the Institution of Electrical Engineers, and a Fellow of the Institute of Fuel. He comes to us fully informed, and he has this important story to tell us. Therefore, I shall not stand between you and Mr. Horsman any longer, but will call upon him to read his paper.

The following paper was then read:

GENERAL

An examination of recent technical literature shows that the subject of this paper has been brought to the attention of the public on numerous occasions with the result that much useful information has been placed on record and made available to all. The contents of the present paper are largely concerned with the simultaneous generation of heat and electricity, and as such they represent the views of a power station engineer, and, in particular, one who is intimately concerned with the efficient operation of electrical generating stations.

A definition of district heating is desirable but somewhat difficult to frame and it is perhaps sufficient to state what is meant by district heating as far as this paper is concerned. District heating is the supply of heat from a central source to a number of buildings in order to satisfy their demands for space heating and domestic hot water. The heat carrier may be either steam or hot water but the source of heat, such as gas, electricity or solid fuel is not necessary to the definition though, in practice, these supplies may be used to augment district heating or for topping up purposes during the coldest weather.

Before proceeding any further it is necessary to explain how district heating in this country can be justified. It is often assumed that district heating should be confined

to those extensive land masses which experience severe winter conditions and that such measures are unnecessary in this island because of its equable climate. This basis of comparison is defective and is likely to lead to a misconception. A second and better basis of comparison and one which applies to many other proposals is that of its economic feasibility. Success in district heating depends to a large extent upon the load factor of the service and it is significant that, from this point of view, the British climate is more favourable than that of New York or of Moscow, where district heating flourishes. It is true that the number of "degree-days" for Moscow is about twice as great as the corresponding number for London, but this is merely another way of expressing the fact that, during the heating season, Moscow is much colder than London. A number of careful investigations into probable load factors for this country have been made and for commercial buildings the range is 20 to 30 per cent., but for housing it is much higher and approaches 40 per cent. Load factors reported from Russia and the U.S.A. are no higher than these estimates and consequently there can be no doubt that there is sufficient climatic justification for district heating in Britain.

Having defined district heating and having established a case for its application on climatic grounds, it is proposed that this paper should be developed in stages corresponding to the following subdivisions of the subject.

- (a) The advantages of district heating.
- (b) Brief descriptions of typical district heating systems.
- (c) Some comments on the design and construction of an extensive distribution system.
- (d) Some comments on the operation, maintenance and management of a district heating system.

(a) THE ADVANTAGES OF DISTRICT HEATING

Some of the merits claimed for district heating by its supporters are set out in the following list. It is not suggested that the list is exhaustive or that the advantages are presented in the order of their relative importance and it may well be that the last item on the list could be regarded as of prime importance to-day in view of the coal situation. The advantages are:

- (1) Improvement in domestic heating standards without involving the occupier in additional fuel costs.
- (2) Reduction in dampness and condensation in the home.
- (3) Reduction in domestic drudgery.
- (4) Expeditious handling of coal and ashes in bulk at the central plant.
- (5) Reduction in atmospheric pollution.
- (6) Saving of fuel as compared with the coal consumption due to open grates.

(1) *Improvement in domestic heating standards without involving the occupier in additional fuel costs.*—The low efficiency of the open coal fire has been established by a number of investigations and the estimates appear to lie between the limits of 15 and 25 per cent. The substitution of district heating of whatever type means that

heat may be generated at much higher efficiency, the appropriate figures for straight heating being 70 to 80 per cent. according to the size of the plant. In order to convey the heat to the consumer, distribution losses are involved, but investigation shows that these are not usually excessive and that the combined efficiency of heat generation and distribution is much higher than that of the open coal fire. Advantage has been taken of this fact to supply more heat to houses than has been available to them in the past. By a careful arrangement of the domestic heating devices, improved heating has been secured. The improvements referred to cover the supply of heat to bedrooms and parts of dwellings which hitherto have received but little consideration. It is usually found that these improvements can be provided at a cost which does not exceed that of solid fuel for a lower heating standard when the fuel is consumed in open grates.

(2) *Reduction in dampness and condensation in the home.*—Little need be said concerning dampness and condensation, their occurrence is a matter of general experience. A dwelling which is adequately heated and also reasonably ventilated should show a reduction in these objectionable and dangerous conditions with a corresponding advantage to the health of the occupier.

(3) *Reduction in domestic drudgery.*—The domestic drudgery to which reference has been made is the work of kindling fires and removing ashes and to the much bigger task of keeping the dust down. The housewife is the person most competent to assess the value of this claim.

(4) *Expedition handling of coal and ashes in bulk at the central plant.*—The advantage of confining the coal delivery and ash removal to the central plant will also be obvious as the materials will be handled in bulk. Whether transport to and from the heating station is by rail or road, district heating will have the effect of reducing the small scale handling of coal and ash which is a feature of the present-day methods.

(5) *Reduction in atmospheric pollution.*—The effects of atmospheric pollution are now well known and any measures which might reduce the evil are to be welcomed. The open coal fire is one of the principal offenders in that it favours the emission of tarry matter. The adoption of district heating should lead to a reduction in pollution because much less fuel is required to provide the necessary heat.

(6) *Saving of fuel as compared with the coal consumption due to open grates.*—The pre-war domestic coal consumption in this country amounted to 36 million tons per annum. It is interesting to speculate as to the coal that might be saved by introducing improved methods of heating. The late Sir Leonard Pearce arrived at such results about five years ago but he had to make assumptions not only with regard to the extent of district heating, but also with respect to the ratio of heat supplied from stations generating heat and electricity to that supplied from straight heating stations. The following table summarises a few of the many cases considered but it should be understood that the savings in coal do not provide for an increase in the domestic heating standards. As already explained, an improved heating standard is a feature of district heating and for this reason the coal savings shown in the column on the right should be reduced by about one third.

Estimated savings in coal due to improved methods of domestic heating

<i>Methods of generating heat and percentages of heat so generated</i>				<i>Total coal saving in relation to 100 per cent. open grates. Millions of tons per annum</i>
<i>Thermal Electric stations</i>	<i>Large heating stations</i>	<i>Small heating plants on estates, central heating, closed stoves and improved grates</i>	<i>Conventional open fire</i>	
<i>% heat</i>	<i>% heat</i>	<i>% heat</i>	<i>% heat</i>	
10	10	10	70	7.83
10	10	20	60	10.10
10	10	30	50	12.37
10	10	40	40	14.64
20	10	40	30	17.73

By plotting the figures in the fourth and fifth columns it will be found that there is almost perfect correlation between them, this means that the potential coal saving will be proportional to the percentage reduction in the amount of coal consumed in open grates. Further examination of the table and in particular of column three shows that economies may be effected by the smaller and less ambitious schemes. The importance of large district heating schemes is, however, clearly shown by comparing the figures in the last two lines. There is some delay in developing a large scheme but it may be that development of smaller schemes such as those represented by column three would mean an earlier realisation of fuel economies. It is appreciated that some of the heating methods just mentioned are excluded from the definition of district heating but the matter is of such national importance as to justify a passing reference in this paper.

(b) BRIEF DESCRIPTIONS OF TYPICAL DISTRICT HEATING SYSTEMS

District heating schemes in general.—It is almost inevitable that district heating activities which have been so successful abroad should spread to this country. Much study has been devoted to the subject during and since the war in order to establish the system here and to secure, if possible, the potential advantages which it offers. Many specific schemes have been worked out to suit as many special circumstances; for example, small housing estates with as few as 500 residents have been considered on the one hand, and a provincial town, having a population of 250,000, on the other. Many schemes of intermediate size have been proposed and some of them have been sanctioned. With reference to the small schemes in connection with new housing estates, these should, notwithstanding their essentially simple nature, realise to some extent most of the advantages already mentioned. It is, however, to the larger schemes that attention is here directed and these schemes usually depend upon the combined generation of heat and electricity in what are known as Thermal-Electric Stations. In the usual electric generating station the steam is admitted to the turbine and expanded to a very low pressure and temperature and is then useless for district heating purposes. By increasing the exhaust steam pressure, its temperature will be automatically raised to a value which

makes it available for heat distribution. The residual heat of the steam is utilised either directly as in American district heating practice or indirectly as in many new plants which transfer the heat to water which then becomes the heat carrier. The Thermal-Electric Station operates in the manner just described and the turbines which operate at high back pressure are termed back pressure machines. These simple explanations of terms should serve to facilitate the understanding of the brief descriptions of Thermal-Electric arrangements which are to follow.

Short descriptions of the three principal types of thermal electric arrangements.—

The first arrangement is shown in Fig. 1, it represents heat distribution by hot water but without heat storage. The essential plant details are stated on the diagram and their functions are as follows. Steam is raised in the boiler plant and is passed to the

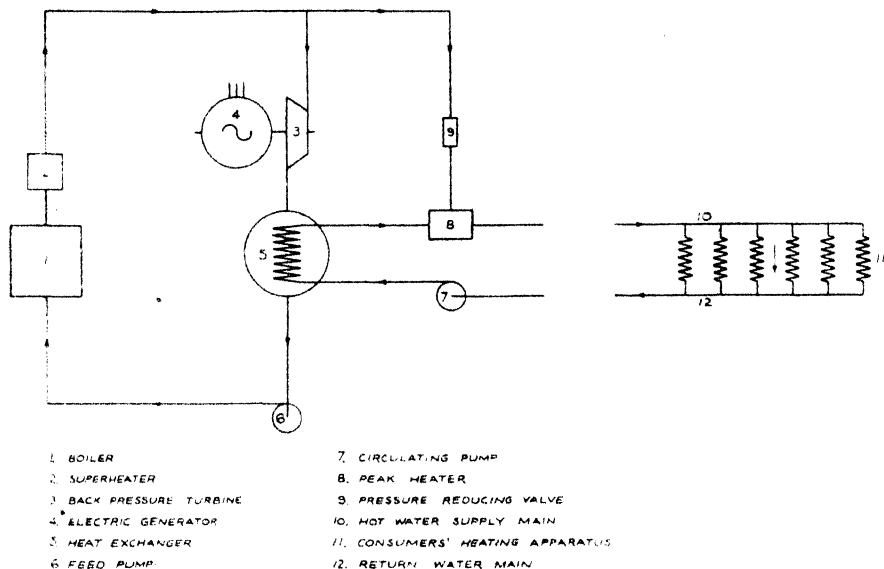


FIGURE 1 - DIAGRAM OF A THERMAL ELECTRIC STATION WITH HOT WATER DISTRIBUTION.

back pressure turbine. After expansion in the turbine, condensation takes place at a controlled temperature in the heat exchanger. The heat of condensation is transferred to the district heating service water which is circulated through the heat exchange and the heating mains as a closed circuit. The steam which is condensed in the heat exchanger is returned in the form of water to the boiler plant for re-evaporation and a repetition of the cycle. The plant normally operates in this way but at times of exceptional cold a peak heater is employed to increase the temperature of the outgoing water in sympathy with the increase in the heat demand. This type of plant has been widely used in Russia. Application is not necessarily a simple matter for, in general, the output of heat and electricity will not be in a fixed ratio at all times. The daily load curves for heat and electricity are not only different in character but the peak demands occur at different times. It is usual to obtain the necessary flexibility by installing normal condensing turbo-generators, to work when necessary, in parallel with the back pressure sets whilst at other times some of the water heating would be performed by steam taken directly from the boiler plant.

The second arrangement is shown in Fig. 2; it differs from the first in that heat storage in a hot water accumulator is provided. Many of the plant details agree with those described in the previous example and it will, therefore, be necessary to consider only how the hot water accumulator functions. Hot water accumulators can assume very large dimensions and they are usually in the form of upright cylinders. The accumulator connected with the Hamburg district heating system has a content of 550,000 gallons of water and a heat storage capacity of 400 million British thermal units. The state of charge of the accumulator will depend upon the relative quantities of hot and cold water contained therein and there will be a well defined plane of separation between the two quantities of water with the hot water above the plane. When the accumulator is fully charged this plane will be near the bottom of the vessel and when discharged the plane will move upwards and will reside near the top. The charging or discharging operation is easily effected by means of the four

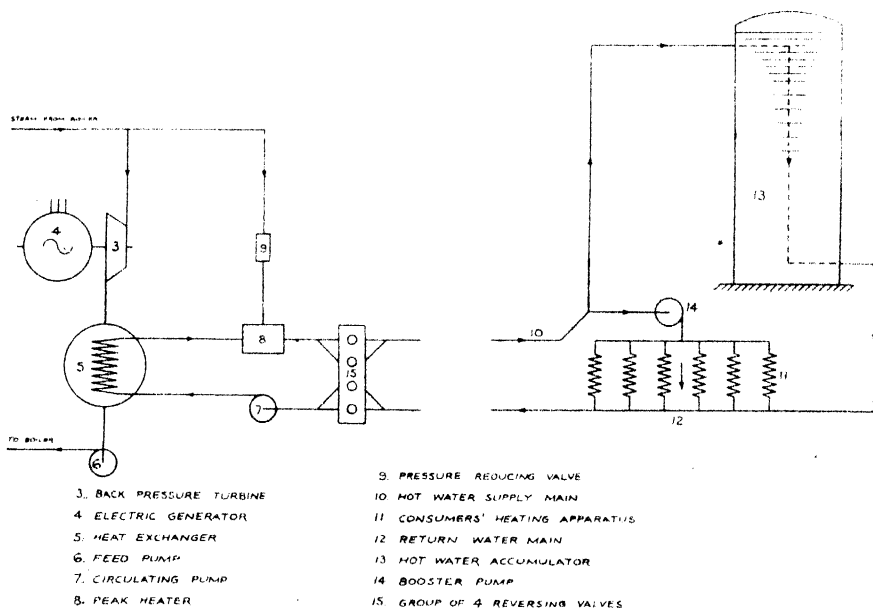


FIGURE 2 - DIAGRAM OF A THERMAL ELECTRIC STATION WITH HOT WATER DISTRIBUTION AND HOT WATER ACCUMULATOR

ARROWS INDICATE DIRECTION OF WATER FLOW DURING CHARGING OF ACCUMULATOR

reversing valves shown in the diagram. The main circulating pump and the local booster pump always run in one direction so that a change from charge to discharge or the converse can be effected without any interruption. It will be seen that the presence of the accumulator confers an additional degree of freedom to the plant in that the maximum demands of the two supplies can each be met by taking advantage of heat storage. The presence of the accumulator may influence the capacity of generating and boiler plant and lead to important savings in capital and to corresponding reductions in the cost of heat.

The third arrangement is shown in Fig. 3; it differs from the foregoing examples in that heat distribution is effected by means of exhaust steam. This Thermal-

Electric system is developing in U.S.A. where steam distribution for district heating is very general. It will be seen from the diagram that exhaust steam from the back pressure turbine proceeds through the underground main and that buildings along the route, such as the one shown on the right of the diagram, are supplied with low pressure steam through pressure regulators. Riser pipes convey the steam to the radiators at the various floors of the building and the condensate discharged from the radiators flows to the basement where it is removed by a high vacuum extraction plant and pumped into the sewers. As, in general, no condensed steam is recovered the provision of large quantities of suitable feed water for the boilers is necessary and the presence of such plant is indicated in the diagram. That the trend in U.S.A. is now definitely in the direction of Thermal-Electric generation with steam distribution is shown by a paper which was presented by W. F. Davidson and

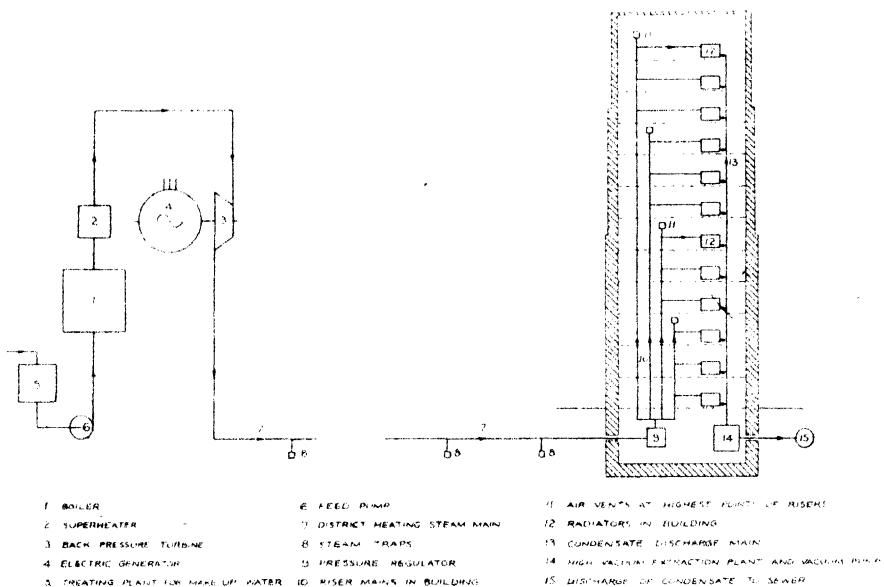


FIGURE 3. DIAGRAM OF A THERMAL-ELECTRIC STATION WITH STEAM DISTRIBUTION.

M. J. Steinberg at the recent World Power Conference held at The Hague. In this paper the modernisation of the two Waterside Generating Stations in New York, and their adaptation to steam and electric supply is fully discussed. Further conversions of this character are envisaged by the Consolidated Edison Company who are applying this same principle to the East River plant. It will be realised that in converting American district heating by steam to Thermal-Electric operation the conditions are very favourable to success in that the nature of the heating load, its maximum demand and load factor are all accurately known in advance. The existence of a distribution system is also a great advantage. Under these circumstances further developments of this kind may be expected and probably only in the case of entirely new projects would distribution by hot water be employed.

Comparative efficiencies of normal electric and Thermal-Electric generating stations.—Having indicated the broad principles of combined generation, it is appropriate to compare the efficiencies of normal electricity generating stations

with those of the Thermal-Electric type. The thermal efficiency of a modern electricity generating station may be taken as almost 30 per cent. and, when the limitations of the usual steam cycle are taken into account, this represents a magnificent achievement. The principal limitation is the large loss of heat to the condenser and it is this heat which is saved by combined generation. In the case of the Thermal-Electric station the only losses that could reasonably be debited to electrical generation are those associated with the boiler plant, the alternators, transformers and certain of the station auxiliaries; this means that the thermal efficiency would be at least 75 per cent. or, in other words, that a unit of electricity could be generated for the expenditure of only 4,500 British thermal units. Realisation of this fact has caused some well meaning persons to criticise the electrical industry for its slowness to develop thermal electric stations, but the technical facts are offset by a number of other considerations to be mentioned later and though some development on these lines is sure to take place in Britain, we can hardly be expected to assume the major role in electrical generation.

The heat losses from district heating mains depend upon the physical dimensions of the system, the load density and the load factor, together with certain details of construction. The losses are not very large and would usually be less than 10 per cent. of the maximum hourly heat demand, the annual loss being less than 20 per cent.

Fuel savings by combined generation of heat and electricity.—The fuel savings to be secured by combined generation have been widely studied and, according to the assumptions made, the estimates seem to lie between 25 and 35 per cent. of the coal required for the separate generation of the two forms of energy. Allowance has been made for this saving in compiling the figures which appear in the earlier table.

(c) SOME COMMENTS ON THE DESIGN AND CONSTRUCTION OF AN EXTENSIVE DISTRIBUTION SYSTEM

Reliability and continuity of supply.—The design of a large heat distribution system calls for the exercise of sound engineering judgment in which reliability should always take first place; economical design is very desirable but quite secondary to reliability. The importance of this will be appreciated by those with experience in the running of a public service. To those who have no such experience it is essential to consider the implications of an interruption in district heating, especially when alternative means of heating are not available. The granting of powers to supply heat to consumers carries with it the obligation to maintain a service at all times. In the case of district heating the availability of the service is very closely related to the thought put into the design of the heat distribution system. It should always be possible to supply heat to any part of the network by alternative routes though the alternative might reasonably involve some reduction in heat supplies. In some of the Russian networks this point was either not fully appreciated or was ignored; radial systems with but few inter-connectors were provided and serious interruptions occurred. It has been reported that such an interruption of several days duration occurred at Kharkov in January, 1935, during a cold spell of 22/31 degrees of frost and that the entire heating system was shut down on the eleventh of the month for twenty-four hours to locate blockages and

to effect repairs. Interruptions of such magnitude must be avoided and assuming that a satisfactory scheme of distribution has been devised, continuity of supply will largely depend upon detail, design, and construction.

Temperature of hot water.—One of the most important features of a hot water distribution system is the temperature at which the water is supplied and in particular its maximum value which occurs on the coldest days. There are economic reasons for selecting a high temperature, say, 250 to 300° F., as by so doing the difference in temperature between the flow and return water may be as much as 100° F. or even more. The greater the temperature difference the smaller will be the rate of circulation of water to convey the requisite amount of heat and the smaller will be the bore of the piping. The main objection to high water temperature is the relatively large pipe expansion involved and the correspondingly large number of expansion fittings which will be required. When it is possible to work at a temperature of approximately 212° F. the expansion may be reduced by as much as 35 per cent. but it will still amount to 5 feet per mile of main. Expansion of steam mains is usually much greater and the sliding type of expansion joint is almost essential to deal with such cases.

Expansion devices, anchors, etc.—The most satisfactory expansion device is, perhaps, the expansion bend. It is apt to assume large dimensions and for that reason it is mostly used above ground. As the majority of district heating mains are housed in concrete ducts or tunnels below ground, it is generally impossible to find space for the accommodation of expansion bends and, therefore, expansion joints of the bellows type are mostly used. The successful application of all expansion joints depends upon correct alignment and, in the bellows joint, any want of alignment may cause localisation of stress with the risk of early failure. Expansion cannot be considered without introducing considerations of pipe anchorage.

The anchoring of mains is a subject of great importance but usual power station practice is inapplicable to district heating. In the power station large offsets are intentionally introduced into steam pipes and the anchors are placed so that expansion is accommodated by the easy deformation of the offsets. In district heating, offsets cannot normally be arranged and the whole of the expansion is taken by the various bellows joints. The anchors alternate with the joints so that each joint has to deal with no more than its fair share of the total expansion. Bellows joints may have five or more corrugations and steps are taken to ensure that each of these is called upon to absorb only its allotted share of the total movement, this is done by placing annular supports between the corrugations, so that if one of these deflects unduly, the movement is transmitted to the remaining corrugations. An interesting case arises where there is a sharp change in the direction of a main as, for example, at a street corner. At such a point it is possible to fix a combined elbow, anchor and expansion piece—American practice often uses this device. Figure 4 shows a combined anchor and tee piece of all welded construction with integral expansion bellows incorporated in each of the three branches. It will be seen from this that district heating pipework is maintained strictly in its assigned direction and expansion is absorbed in an axial manner.

Pipe enclosures.—Pipe enclosures usually assume the form of concrete ducts or, if the pipes are large and numerous, a tunnel may be employed. There are many

detail variations in the design of ducts but it is essential that they should possess sufficient mechanical strength to withstand superimposed loads. They should also be watertight so as to prevent ingress of water from the surrounding soil. They should, in addition, be constructed in the form of a culvert so that leakage from pipe joints will drain away to suitable collecting points. Figure 5 shows what is perhaps the most popular duct section in use in America. The duct is constructed of cast in situ concrete with reinforcement as shown. After the excavation of the trench a stratum of crushed stone or gravel is laid down and if it is necessary to drain the

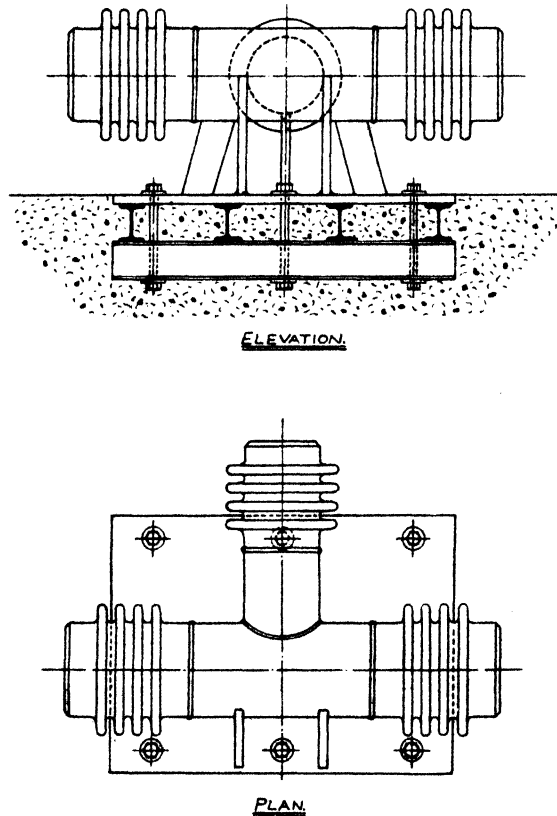


FIGURE 4 - FABRICATED TEE PIECE AND ANCHOR WITH EXPANSION BELLOWS IN EACH OF THE THREE LIMBS.

ground, a tile drain is constructed in the gravel. The concrete base of the duct is now poured and, after this has set, the pipe is lowered into the trench and supported on temporary rollers and welding takes place. The permanent rollers, alignment guides, anchors, and so forth are now attached and the piping finally aligned. The next operation is to submit the pipe to a hydraulic test and, providing this is satisfactory, the insulation is applied. The last step in the construction is to complete the concrete envelope. This is done by erecting wooden shuttering around the finished pipes, fixing the reinforcing bars in position and pouring the concrete into the matrix between the shuttering and the sides of the trench. The timber shuttering

is not recovered and for this reason the practice would probably be inadmissible in England at the present time. Figure 6 shows another design of duct suitable for two mains such as the flow and return mains of a hot water distribution system.

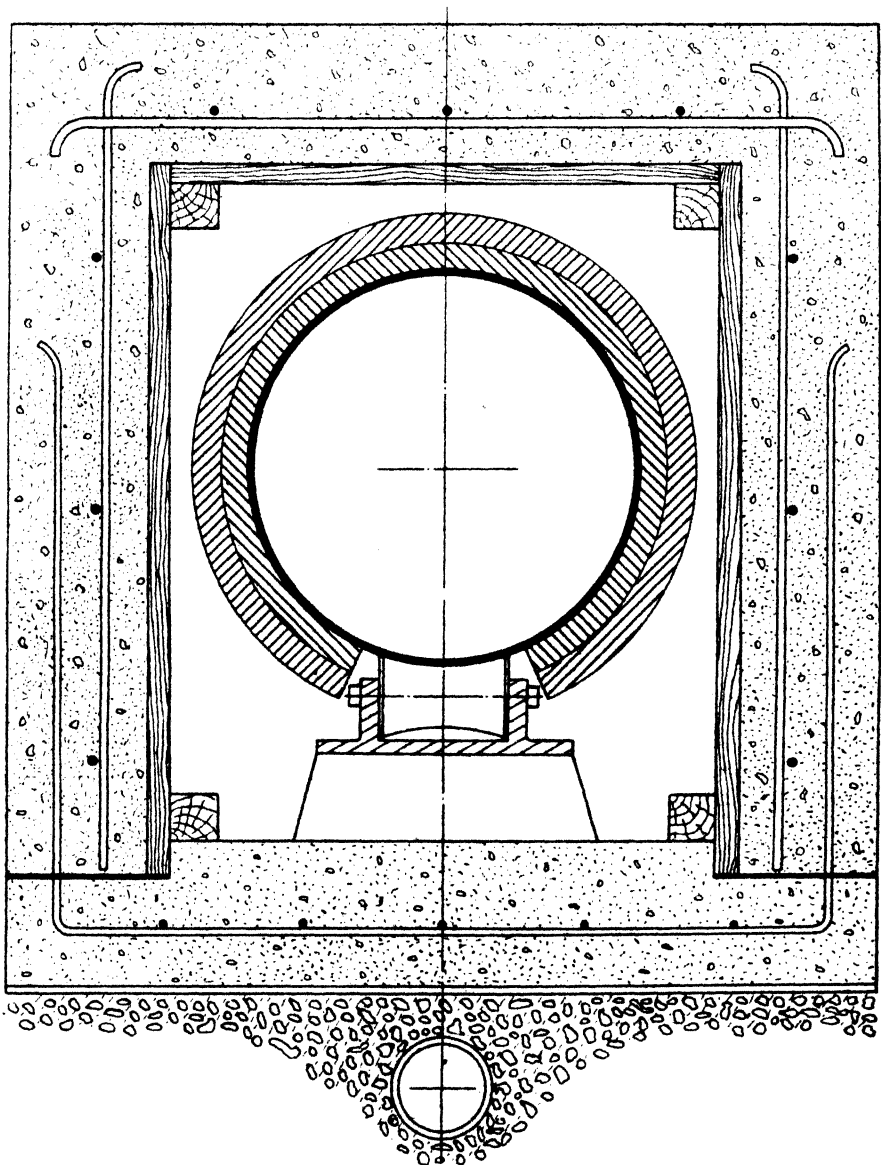


FIGURE 5.

Its construction resembles that of the last example in that the lower portion of the duct is cast in situ and rests upon a base of crushed stone. The upper portion of the duct, however, is of pre-cast concrete and is removable. There are longitudinal joints as shown and also spigot joints between the various sections of the upper

portion, and a jointing compound is used to render all the joints watertight. The position of the horizontal joints is at a relatively high level thus reducing the tendency for water to leak inwards, but the level selected does not interfere in any way with the welding of the pipe joints. The pre-cast covers would be provided with stout hooks to facilitate the attachment of lifting tackle.

Loss of heat from ducts.—The loss of heat from district heating mains is a matter of great interest; it has often been assumed that the loss would, in general, be high and sufficient to preclude the long distance transmission of heat. Such an

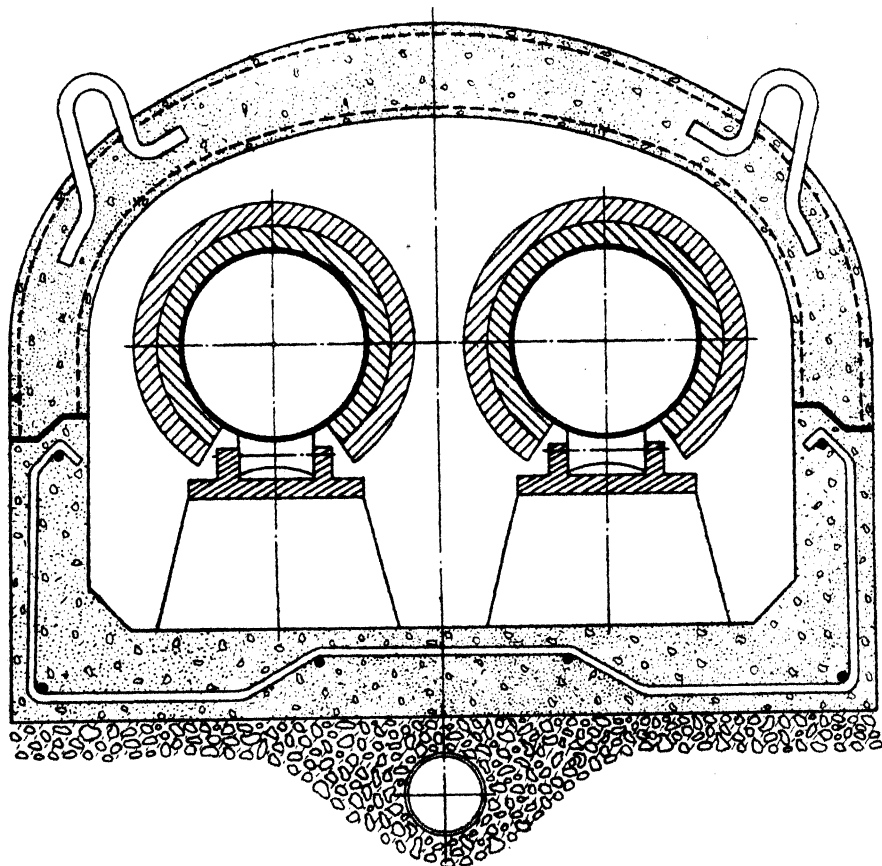


FIGURE 6.

assumption is disproved both by theory and practice. Many attempts have been made to determine the loss of heat from complete assemblages of pipes and ducts but the subject is still in a state of development. It is found that the rate of heat transmission averages about 0.25 British thermal units, per square foot of external pipe surface, per ° F., per hour, when the lagging thickness is 2 inches. The temperature difference to which this transmission rate applies is the hot water temperature, minus the temperature of the ground external to the duct. If the surrounding soil is damp or wet, the loss of heat might be much greater than the figure stated and this fact alone will show how difficult the determination of heat loss rates can be.

It is opportune to mention at this point the influence of heating ducts upon ground temperatures. In this country the ground temperature averages 50° F., the seasonal variation of temperature being slight. The presence of a heating duct will raise the temperature of the ground in its vicinity and this point should be considered in relation to its effect upon the current carrying capacity of buried cables near the duct. Efficient lagging should always be used not only to economise in heat, but to reduce the heating effect in the ground surrounding the duct. The pipe lagging will deteriorate if exposed to moisture and in such a case there would be an increase in the heating effect exterior to the duct. As already stated, the base of the duct should be formed into a culvert so as to prevent the collection of water and to safeguard the insulating properties of the lagging.

(d) SOME COMMENTS ON THE OPERATION, MAINTENANCE AND MANAGEMENT OF A DISTRICT HEATING SYSTEM

Disposal of electricity to the electrical grid.—The operation of a district heating system will be influenced by the type and magnitude of the undertaking. The disposal of by-product electricity will depend upon the ability of the receiving system to accept the energy. The assumption is frequently made that by-product electricity can always be absorbed by virtue of the existence of the electrical grid but, in general, this is not true. The night load on the grid system is a mere fraction of the maximum day load and, for this reason, there could be difficulty in accepting by-product electricity at night. It is a principle of grid operation that the night load should be shared by the most efficient base load stations and any large scale import of electricity might have undesirable repercussions on the operation of such stations. If Thermal-Electric stations are developed to a great extent, restrictions of electrical output at night would certainly be imposed and, at such times, the continuity of the heat output would be secured by heating the service water with steam taken directly from the boilers. Alternatively, by employing a hot water accumulator this could be charged during the running period of the back pressure turbines and the stored heat could, if desired, be used at night. In summer and mild weather the heating load would be small and the generation of by-product electricity would be correspondingly reduced, but, as the seasonal variation of the electrical load is much less than that of the heating load, there would be a deficiency in the amount of electricity generated. This deficiency would be met, in part, by running the condensing sets, a number of which would almost certainly be installed in the Thermal-Electric station. Any residual shortage of electricity would be imported from the grid but this is based upon the assumption that the necessary grid capacity is available at the time considered. The greater the extent of Thermal-Electric development the more critical could the position be and it is clear that there must be some limitation to such development.

Proposals for controlling an extensive heat distribution system.—The foregoing is mainly concerned with the disposal of electricity but there is the complementary problem of controlling the heat distribution, and the following remarks indicate some proposals which have been made. If the extent of the mains is considerable, sub-stations may be required just as with other services. From each sub-station local heating mains would radiate and convey heat to the individual consumers, the

quantity being controlled, if water is used as the heat carrier, by booster pumps and regulating valves. The sub-stations would probably be unattended, as in traction work, and the plant would be operated remotely by what is known as supervisory control. This method of control has been extensively employed on the Electrical Grid System and has given a good account of itself. By this means the district heating control engineer, located at a central point, would be able at all times, to ascertain the essential facts concerning the heating operation. Such data as pressures, temperatures and heat quantities in any part of the system would be obtainable on demand. He could, if required, send out impulses which would initiate the starting up or the shutting down of plant in the unattended sub-stations. The state of all apparatus would be shown on a mimic diagram in full view of the controller. The control apparatus used would be of the same general type as that used in telephony and it would be possible to effect innumerable operations by the use of a few signalling circuits.

The continuous efficient operation of the system would call for regular inspection and maintenance and this work would probably be organised and carried out by the repairs and maintenance staff of the generating station. Special provision would be made for changing defective plant with expedition and to this end, standardisation of motors, valves, etc., would be practised. A number of special vehicles would be provided to deal with trenching operations, concreting of ducts and the site welding of pipes.

Metering of heat supplies and charges for heat.—The metering of heat to the consumer is a matter which has been closely studied with the result that the provision of costly heat-flow meters is justifiable only in the case of large buildings such as a complete block of flats or a small estate. In the case of individual dwellings the cost of meters would be excessive though the periodic reading of the meters could, in some cases, be simplified by combining it with the reading of electricity meters. Tariffs for the supply of heat would be framed by the management; they would vary in form with the method of estimating the heat consumption. In the case of small dwellings there would be a strong case for supplying heat at a flat rate and for simplicity this charge could be included in the rent. As already stated, the increase in rent is generally no more than would cover the cost of coal consumed in the ordinary way to satisfy a lower standard of heating.

In concluding this review it should be stressed that the subject is so extensive and its ramifications so numerous that a superficial impression is all that can be conveyed in so short a statement. There are many interesting aspects of the subject upon which comment has been withheld not merely because of the allotted extent of the paper, but because their inclusion could, possibly, lead to confusion. It is hoped that this review will provide a useful background for the consideration of district heating and if this is so the object of the paper will be achieved.

ACKNOWLEDGMENTS

The author's thanks are due to Mr. S. B. Donkin, M.I.C.E., M.I.MECH.E., M.I.E.E., for much practical advice in the preparation of the paper, to Mr. A. E. Margolis, DIPL. ENG., for information taken from his writings, and to Mr. R. R. Martindale A.M.I.E.E., M.INST.F., for permission to prepare the paper.

DISCUSSION

THE CHAIRMAN: We have enjoyed a great amount of valuable information concentrated into this one paper. Also, I think that Mr. Horsman has avoided being too technical, although he has had to make his paper highly informative both to laymen and to technicians. He is prepared to answer any questions which anyone would like to ask of him, so the meeting is now open for discussion.

QUESTION: Could the author give us some idea of the cost of a system to be incorporated in the development of a housing estate for about 4,000 people?

Mr. H. S. HORSMAN: If the speaker requires an estimate of the capital cost of such a system it will be necessary to enumerate the items included. Some quotations include, while others exclude, the cost of heat utilising apparatus in the various houses. The question is very vague not only in the foregoing sense but also because the supply of heat can be influenced by so many local conditions. However, if we are merely concerned with the order of magnitude of capital costs, an approximate quotation would be £160,000, it being understood that this applies to a straight heating scheme.

A large number of projects have been developed of late and I have followed some of these carefully. They have not been of any one type, but I have come to the general conclusion that it would not be unreasonable to fix the cost of one therm at, say, 8d. although it would be safer to give a range of, say, 7d. to 9d. per therm. This information may conceivably be more to the point than the mere quotation of capital cost.

Mr. R. H. RAWLL, M.I.E.E., M.I.MECH.E. (Senior Executive Officer, Shoreditch District, London Electricity Board): I am an electricity supply engineer and am interested in this subject. It seems to me that the position in this country is that the application of district heating will apply primarily to new buildings, because we have to consider the alteration of existing heating installations in existing buildings if district heating is applied, and we have also to consider whether we shall find room for our transmission pipes in the roads. Therefore, I feel that the future of district heating in this country will be bound up largely with new buildings.

New buildings at the moment fall into two categories, namely, those to be erected in "blitzed" areas and new housing estates. As regards the possibility of large thermal-electric stations supplying district heating to new housing estates, one would usually find that the new power station would be located a considerable distance away. Therefore, to supply district heating in such a case, it would be necessary to put down a small plant. On the other hand, there are some blitzed areas—one being the City of London—where this problem of district heating has been very seriously considered. As one who played a humble part in providing some information for the report, which the consulting engineers have produced with regard to this district heating scheme for London, I think a case can be made out that, if existing power station sites are within an economical distance of such areas, then it would be possible in those circumstances to utilise a large thermal-electric station.

What does the author consider to be the economic limit of transmission of district heating on a large scale? I have in mind somewhere in the region of two miles.

Finally, there is one thing which could be done at present with an eye to the future, and that is, that in all new buildings in which central heating is to be applied, it would be comparatively easy to arrange the heating installation at the outset in such a way that, if district heating became available at a later date, the heating installation could then be conveniently connected to the heat transmission mains. If that is borne in mind it might save a lot of possible expense in the future.

Mr. H. S. HORSMAN: I, too, have in mind the devastated areas of the city and lots of other devastated areas which lend themselves to this treatment in that some re-organisation of all the services will be required, and it will be a pity if we cannot take advantage of re-building.

I can also see the reason for establishing the economical radius for the transmission

of heat, and in that connection I have been associated with a very large scheme which applies to the complete town mentioned in my paper. In that case there were no less than 64 miles of main distribution pipe work without considering in any way the local distribution, and although one does not wish to criticise a scheme with which one is associated, it is my belief that the scheme was spread out too much. In that connection the maximum radius of the main transmission would have been about three miles, but I have often thought that if transmission had been restricted to about one and a half miles, the economics would have been favourably affected.

I think, without being too definite, that the economic radius of action might be about two miles.

MR. G. VIVIAN DAVIES: We have heard a great deal about district heating, and there have been many papers read recently on the subject, but most of them seem to be directed towards proving that district heating is a very complicated business and not a very practical one. Most people seem to vie with each other, particularly from the electricity aspect, as to why it cannot be done. Surely the answer is to build a station and see what happens? Other countries have done it—Germany, America, Russia—and I cannot believe that in such a highly-industrialised country as this there is not one suitable site. Out of all the new electricity stations which are going up, not one, to my knowledge, is to be a thermal station.

The first requirement of a successful large scale thermal scheme is surely a primary industrial or factory load combined with a secondary or domestic load, and I can think of at least two such sites in this country where in addition they have a coal field alongside. Finally, on the Hillingdon Factory Estate near Glasgow, steam as well as electricity has to be bought by all manufacturers as a condition of their leases from a central station and is quite simply measured by standard steam meters.

MR. H. S. HORSMAN: So far as the electricity industry is concerned, it is not a question of failing to realise the advantages of thermal-electric operation, but rather a matter of putting first things first. I think that a lot of people will agree when I say we must have standard generating plant, because our need for that is very acute at the present time. If what we are now discussing had been a pre-war matter, I think there would have been far more force behind the suggestion that we should immediately try out a large thermal-electric station; but, speaking unofficially, I think there is no doubt that it will come in due course. The thing to do at the present time is to instal standard generating plant and make up the arrears caused by the war.

QUESTION: We have been given comparative figures of the saving of coal which district heating would bring about, but they are savings compared with the open fire grate. In London a great many people heat water and their homes either by electricity or gas, and I should be glad if the author could give us some figures showing the saving by district heating as compared with gas or electricity for those purposes.

MR. H. S. HORSMAN: This is a controversial matter and there is no doubt that gas heating is more efficient than the open fire which means that the saving due to the displacement of gas by district heating would be less than those tabulated in the paper. This modifying influence would require consideration if, for any reason, it was decided to displace gas heating on a nation-wide scale. On the other hand, electricity is already established for lighting and power and is, therefore, generally available for heating also. It is reasonable to suppose that electricity will retain this advantage and there could be some difficulty in justifying the simultaneous use of the two services. I do not wish to introduce any invidious comparison between electricity and gas and, for the purpose of the paper, I regard them as useful for "topping up" a district heating service, but not as fundamental sources of space heating.

QUESTION: With regard to the question of the two-mile radius of action in

connection with the distribution of hot water under the district heating system, does that mean that you would not consider that hot water or steam should be used for that purpose beyond a radius of two miles from the thermal-electric generating station used for electricity supply as well as district heating?

Mr. H. S. HORSMAN: My statements in that connection are based on my experience with regard to large town schemes to which I have already referred. It was clear to me that by going further afield for our heating load we were accepting increasing commitments and capital costs. There were also very serious engineering difficulties, one, in particular, referring to pumping arrangements to get the water round such a system. In certain cases it was found that there would be no less than five pumps in series all working together, which would provide a headache for any engineer. It would not provide such a bad headache with the assistance of supervisory control, because the engineer would know all the circumstances about the pumping operation and he could control all pressures referring to each of the five pumps in such a way as to guarantee the satisfactory operation of the system as a whole. Economic considerations, however, are still great, because distant action means greater cost and expense of distribution; it even affects the temperature of the water which has to be sent out. Based upon a consideration of all these facts, both economical and engineering, I have formed the opinion that two miles is a reasonable radius of action and not four or five miles, although in an engineering sense you can send water as far as you like.

THE CHAIRMAN: We have had a fairly good group of questions and I think the author has stood up to them very well indeed. I believe you will authorise me to thank him very much indeed for his very interesting paper, and for the most interesting way in which he answered the questions.

The vote of thanks was carried with acclamation, and the meeting then terminated.

DEATH OF MR. J. H. BUCHANAN

We record with deep regret the death on May 18th of Mr. J. H. Buchanan, a former Examinations Officer and Accountant of the Society. Like so many of his colleagues Buchanan spent virtually his entire working life in the Society's service. He came in 1893 as a young man and retired in 1938, 45 years later.

In 1900, at the age of 27, he was appointed Accountant, and in this capacity he was given the responsibility for the organisation of the Examinations, in connection with which he made his most notable contribution to the Society's work. While under his charge, the Examinations increased tenfold in scale (from about 10,000 entries a year to approximately 100,000) and their scope also was greatly widened. This remarkable development was due in no small manner to Buchanan's initiative, industry and powers of organisation, and by way of recognition of the expansion which was taking place he was in 1917 granted the title of Examinations Officer as well as Accountant.

To him also is largely due the establishment of the Society's Printing Press, which has for many years now been a most valuable adjunct to the Examinations Department, as well as to the general work of the Society.

Shortly before the time for his retirement Mr. Buchanan suffered a severe illness through which his health was permanently impaired; since then he has borne with patience several further serious illnesses and continued weakness which must have been singularly trying to one of so energetic a temperament.

GENERAL NOTES

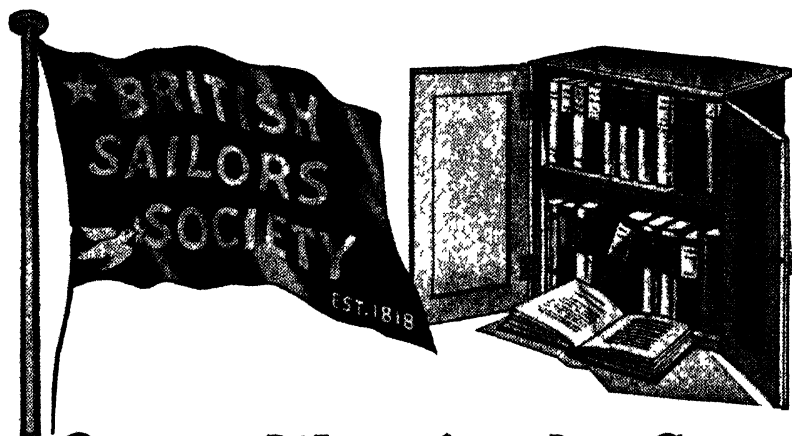
EXHIBITION OF DUTCH AND FLEMISH MASTERS.—The visitor to Eugene Slatter's Exhibition of Dutch and Flemish masterpieces mainly of the seventeenth century, on view at 30 Old Bond Street until July 10th, has the double satisfaction of inspecting a precious painting by a hitherto unknown Antwerp master and contributing to a really worth-while cause. The proceeds from the sale of the illustrated catalogue are to be given to the National Art-Collections Fund.

The discovery of a panel depicting "Balaam and the Angel in a Wood", signed by Jasper Van der Lanen and dated 1624, is an event that deserves wider publicity than it will be accorded in a few art periodicals addressed to connoisseurs. The painting, which contains the most wonderful passages of blue relieved by notes of pink and warm red in the garments of the foreground figures, would enrich one of our National Collections—and indeed it was for just such a purpose as this that the Fund was founded.

The remaining two dozen panels are in more characteristic genres, flower-pieces, river scenes, and a few minutely painted interiors, ranging in scale from a large and typically grotesque carousal scene by Pieter Brueghel to Pieter Van Slingeland's tiny gem of a "Girl feeding a Parrot", marvellously limned with a miniaturist's brush. Salomon Van Ruysdael and his nephew Jacob are admirably represented, the older artist by a perfect little scene of "Shipping at the Mouth of the Dort". The eye travels across the broad estuary, with some sailing boats in the middle distance, to a line of distant wind-mills and buildings painted with infinite delicacy in tones of biscuit and blue-grey.

Flower-pieces by the Amsterdam master Jan Van Huysum and Nicholas Van Verendael of Antwerp, a rare still-life by Willem Kalf, and an endearingly intimate Gerard Dou are other works which enchant the eye with their magic, and make one long to discover more about the lives of the magicians.

N. A. D. W.



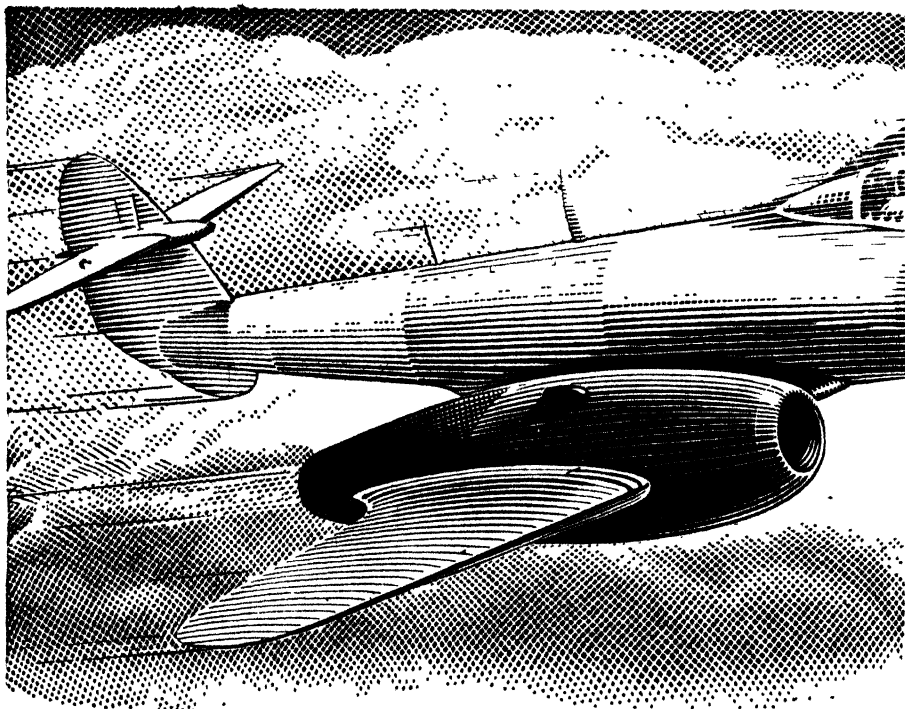
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COURTAULDS

IN THE UNITED KINGDOM

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IN the 1820's Courtaulds' Essex-made silks were beginning to find their way to world markets through the country's textile merchanting centres. Several Manchester houses have been continuously supplied by the firm with piecegoods for more than a century.

In 1886 the late Sir Thomas Latham was appointed the firm's Lancashire sales agent in the cotton capital and he subsequently played a leading part in the foundation and development of the rayon industry, becoming deputy chairman of Courtaulds in 1917. Today the Company has two sales offices in the city—one at 36 Church Street for its piecegoods; the other at 28 Princess Street for its rayon yarn and staple.

Since the 1914-1918 War, Courtaulds activities in the Manchester area have been industrial as well as commercial.

Firstly, in 1916, the shortage of chemical supplies led to Courtaulds building their own factory at Trafford Park, which produces chemicals for use in the Company's other works. It is the largest producer of carbon bisulphide in the country, and makes large quantities of sulphuric acid by the most modern process.

Secondly, in 1920, the Company acquired a site at Droylsden on which was erected a yarn dyehouse, where improved techniques for dyeing rayon, today universally accepted, have been developed and demonstrated commercially.

These two factories on the city fringe undertook important additional tasks during the Second World War. Trafford Park manufactured chemicals for munitions, while Droylsden dyed, camouflaged and proofed military equipment.

Of more than 23,000 people now directly employed by Courtaulds in the United Kingdom, about 600 serve the Company in this great textile centre of Manchester, each doing his part in the national interest of putting more and better rayons into the ships and shops.

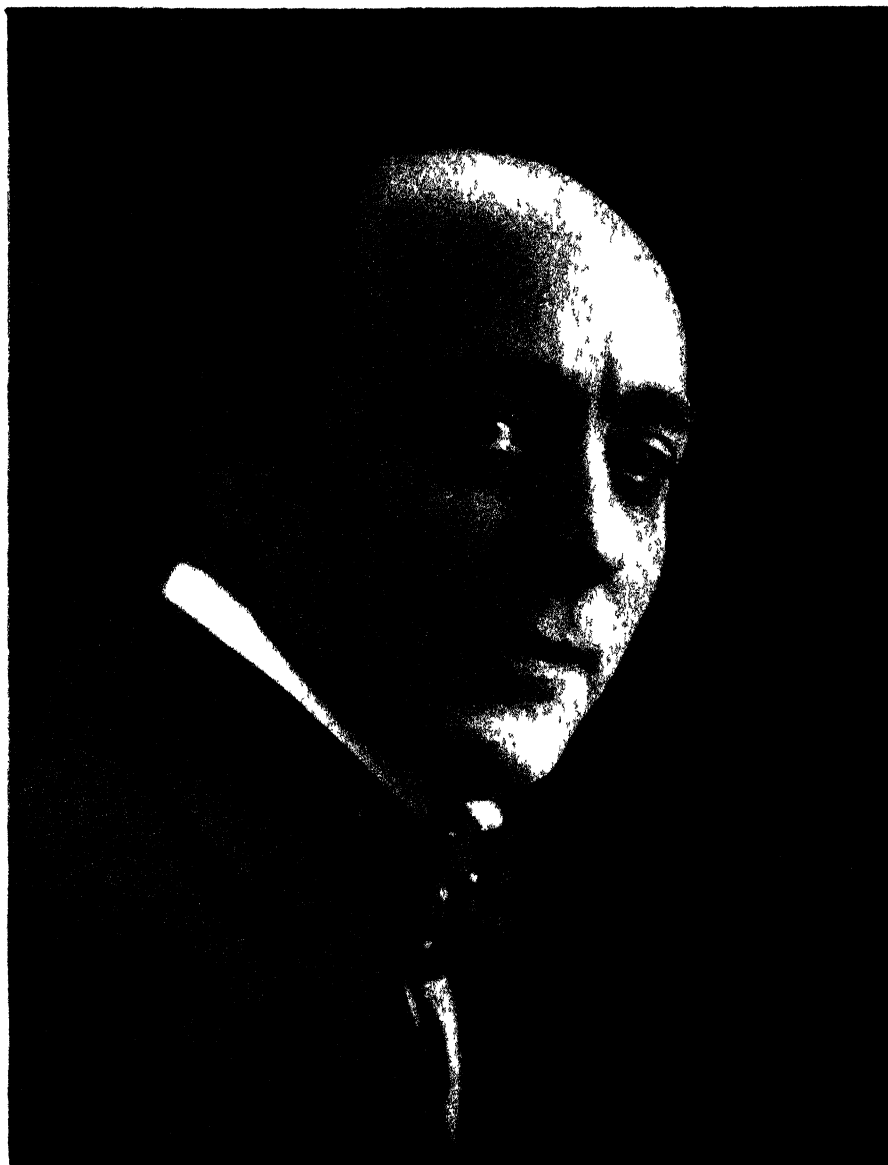
This is one of a series of statements to inform the public of some part of the contribution made by Courtaulds' industrial enterprise to economic well-being in various districts of the United Kingdom.

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4771

FRIDAY, JUNE 18th, 1948

Vol. xcvi



SIR WILLIAM REID DICK, K.C.V.O., R.A , *Albert Medallist for 1948*

FINANCIAL STATEMENTS FOR 1947.

The following statements are published in this week's *Journal* in accordance with Sec. 25 of the Society's Bye-laws :—

BALANCE SHEET, 31st December, 1947.

1946	£	£	s.	d.	£	s.	d.	£	s.	d.	1946	£
		General Fund Accounts—				General Fund Assets—						
		General Purposes Capital Account per annexed account (page 424)				Freehold Property, 68 John Adam Street : Cost in 1922, plus additions, less sales and compensation received						
83,845					88,263	12	7				49,787	16 7
		Dr. Cantor's Bequest : Balance at 31st December, 1946				Leasehold Property, 67 Abbeville Road, Clapham : Cost in 1946						
6,356					6,356	5	0				1,486	33
		44d : Profit on Investment realised				Less Amortisation of Lease						
					6,422	15	5				1,453	
		Lord Bennett's Bequest				Pictures, Books, Furniture and Fixtures (as fixed in 1919)						
					2,500	0	0				10,000	0 0
6,123					6,832	9	7					
		Life Composition Account (page 424) : Unexpired balance of compositions received on the basis of taking credit for such compositions over a period of 12 years from their receipt				Investments : Freehold Ground Rents, at cost						
					104,623	17	7				10,092	
		Specific Fund Accounts (page 424)—				Securities (page 424) : General (Market Value £28,985)						
		Amount accumulated towards pensions payable under Modified Superannuation Scheme				Dr. Cantor's Bequest (Market Value £6,370)						
10,020					10,279	0	5				27,255	
		Provision for Rehabilitation of Building, including £500 gift in memory of the late Lord Amulree				Lord Bennett's Bequest (Market Value £2,500)						
5,377					5,512	0	7				6,356	
343					537	0	9					
15,740		Industrial Art Bursaries Fund Account				Held towards meeting pensions payable under Modified Superannuation Scheme (Market Value £7,229)						
					16,323	10	9				6,711	
		Liabilities—				Fund for Rehabilitation of Building (Market Value £4,567)						
		Creditors				Stocks of Stationery and Working Papers of Examinations Department at value estimated by the Society's printer						
2,830					4,020	7	3				1,669	0 0
1,561					110	3	9				2,079	0 3
		Colombo New Cathedral Competition				Debtors and Payments in Advance						
		Industrial Art Bursaries in suspense owing to the war				Cash at Bankers and in Hand						
633					435	0	0				5,081	19 9
		Industrial Art Bursaries awarded (but not expended)				Carried forward						
425											8,830	0 0
		Contributions received for Industrial Art Bursaries but not awarded										
155					198	8	0					
		Preservation of Ancient Cottages Fund										
206					180	3	3					
		Cadman Memorial Fund										
25					225	17	6					
		Modified Superannuation Scheme										
		Unexpended Trust Income less Income over-expended (page 426)										
1,475					26	19	8					
7,310					1,678	15	7					
		Carried forward				127,828 3 4						
124,374					127,828	3	4				124,374	

BALANCE SHEET, 31st December, 1947—continued

1946	£	l	s	d	1946	£	s	d		
124,374		127,828	3	4	Brought forward		127,828	3	4	124,374
					Trust Fund Accounts—					
23,247		23,247	3	9	Capital Investments (page 425)		23,247	3	9	23,247
1,476		1,678	15	7	Income due from the Society		1,678	15	7	1,476
24,723										24,723
					Modified Superannuation Scheme—					
					Investments at cost (page 425) (Market Value £1,518)		1,484	18	6	1,333
					Due from the Society		26	19	8	24
										1,557
							1,511	18	2	1,557

Notes

On behalf of the Council

1 Credit has been taken for the whole of the scrip received during the year although some relate to periods expiring after the date of the Balance Sheet, but no credit has been taken for subscriptions due but unpaid at 31st December, 1947.

2 In addition to the provisions already mentioned, the Society has made provision in connection with the Modified Superannuation Scheme for payments to two author members of its staff.

H. A. F. FINLAY, Chairman
WILLIAM WILKINSON, Treasurer
J. MUNRO KUNZ

£100 4d

£154 266 0 9

£154 266 0 9 £150,454

Report of the Auditor to the Council and Fellows of the Royal Society of Art

We have examined the above Balance Sheet dated 31st December 1947 and are satisfied that the statement and explanations are, in our opinion, such as they should be, properly drawn up so as to exhibit a true and correct view of the state of the Society's affairs according to the best of our information and the explanation given to us and as shown by the books of the Society.

5 London Wall Buildings,
London E.C.2
17th June, 1948

D. LOHILL, FLENDLER, GRIFFITHS & CO., Auditors
(Chartered Accountants)

GENERAL PURPOSES CAPITAL ACCOUNT

for the Year ended 31st December, 1947.

1946		£	s.	d.		£	s.	d.	1946
£	Contribution under Part I, War Damage Act, 1943, refunded to Tenants	12	3	11	Balance at 31st December, 1940 ...	88,814	14	8	88,814
7	War Damage Repairs and Rehabilitation Expenses ...	3,852	3	6	Repairs recovered from the War Damage Commission ...	280	12	2	—
—	(N.B.—No provision has been made for War Damage Repairs outstanding nor credit taken for amounts recoverable from the War Damage Commission)				Excess of Income over Expenditure per foregoing Account ...	3,597	13	2	462
					Profit on Conversion and Redemption of 3% Defence Bonds ...	10	0	0	
88,845	Balance per Balance Sheet	88,808	12	7					
£88,846		£92,733	0	0		£92,733	0	0	£88,846

LIFE COMPOSITION ACCOUNT for the Year ended 31st December, 1947.

1946		1946	
£	£ s. d.	£	s. d.
Amount taken into the Society's Income—		Balance at 31st December, 1946 ..	6,123 4 5
One-twelfth of Compositions received during twelve		Compositions received during year	1,920 15 6
years to date	1,211 10 4		
Balance per Balance Sheet	6,832 9 7		
	£8,043 19 11		£8,043 19 11
			7,267

SPECIFIC FUND ACCOUNTS for the Year ended 31st December, 1947.

1946		1946	
Amount accumulated towards pensions payable under Modified Superannuation Scheme -		Provision for Rehabilitation of Building	
£	£ s. d.	£	£
9 7 65	Balance at 31st December, 1946 10,019 19 6	Balance at 31st December, 1946	5,377 0 7
	Add: Interest received and profit on realisation of investments	Add: Interest on Investment	125 0 0
252	(£17 10s. 10d.) 259 9 11		5,502 0 7
			5,377
		Industrial Art Bursaries Fund Account	
		Balance at 31st December, 1946	343 1 3
		Add: Provision for Bursaries (in suspense during the war) no longer required	198 16 6
		Contributions received	305 0 0
			546 17 3
		Deduct: Bursaries awarded for 1947	£300 0 0
		Cost of Pamphlets	9 18 6
			536 16 6
			503
			537 0 9
			543
£10,020	£10,279 9 5		

INVESTMENTS.
31st December, 1947.

[illegible]

TRUST INCOME AND EXPENDITURE
for the year ended 31st December, 1947.

	Unexpended Income 1st Jan. 1947.	Income received during year. £ s. d.	Expenditure on lectures, prizes or towards cost of Journal. £ s. d.	Amount applied to Society's General Purposes. £ s. d.	Unexpended Income carried forward 31st Dec. 1947. £ s. d.
Dr. Aldred Trust	16 10 4	5 8 2	—	—	16 4 0
Art Congress Studentship	336 18 8	47 7 0	—	—	384 5 8
R. B. Bennett Empire Prize Trust	Dr. 6 2 6	45 0 0	—	—	38 17 0
Sir George Birdwood Memorial Fund	112 18 4	25 14 8	15 15 0	—	122 18 0
Selwyn Brinton Trust...	132 12 1	30 0 0	30 0 0	—	132 12 1
Francis Cobb Trust	60 9 6	8 18 10	—	—	69 8 4
Alfred Davies Bequest	—	61 3 4	—	61 3 4	—
Le Neve Foster Trust	12 17 8	12 17 8	10 0 0	—	15 15 4
John Fothergill Trust	37 15 0	9 11 0	—	—	47 6 0
Thomas Gray Memorial Trust	181 16 8	316 13 6	307 1 4	—	191 8 10
Howard Trust	56 1 11	19 19 0	—	—	76 0 11
Owen Jones Memorial Trust	190 18 0	14 4 0	—	—	205 2 6
Nell Matheson McWharrie Trust	Dr. 14 5 0	10 10 0	20 0 0	—	Dr. 10 4 5
Dr. Mann Trust	26 19 0	36 0 0	64 8 6	—	Dr. 7 9 6
Mulready Trust	54 9 10	3 17 10	—	—	58 7 8
North London Exhibition Trust	55 5 1	4 14 0	—	—	59 19 7
Sir William J. Pope Memorial Fund	6 2 0	10 14 4	—	—	16 18 4
Russian Embassy Prize	50 0 0	3 10 0	—	—	53 10 0
Benjamin Shaw Trust	3 11 0	3 5 8	—	—	6 16 8
John Stock Trust	32 10 5	2 9 2	—	—	34 19 7
Dr. Swiney's Bequest	120 0 0	180 0 0	—	140 0 0	160 0 0
Trueman Wood Lecture Endowment Fund...	—	32 10 10	32 10 10	—	—
	£884 16 0	£479 15 8	£201 3 4		
	1,482 1 6				1,690 9 6
Dr. 6 16 11					Dr. 11 13 11
£1,475 4 7					£1,678 15 7

PRESERVATION OF ANCIENT COTTAGES FUND.
INCOME AND EXPENDITURE ACCOUNT
for the year ended 31st December, 1947.

1946		£ s. d.		1946		£ s. d.	
£	s. d.	£	s. d.	£	s. d.	£	s. d.
6		8	13 2	Donation	1	0	0
				Interest on Investments	47	0	6
				Rents Receivable	30	16	0
88		115	18 8	Excess of Expenditure over Income transferred to Capital Account...	45	15	4
<u>£94</u>		<u>£124 11 10</u>			<u>£124 11 10</u>	<u>£94</u>	

BALANCE SHEET, 31st December, 1947.

1946 £		£ s. d.	£ s. d.		£ s. d.	£
	Capital Account— Balance at 31st December, 1946	2,776 7 7		Cottages at Dravton St. Leonard (James Cranston Bequest) and Westmill—as fixed in 1932 ..	1,000 0 0	1000
2,741	Less : Excess of Expenditure over Income as above	45 15 4		\$500 3% Savings £ s. d. Bonds, 1955 65 at cost	500 0 0	
<u>15</u>				£182 3s. 6d. 3% Sav- ings Bonds 1060.70 at cost	132 4 5	
2,726	Add: Loan written off 31.12.41 now recovered		2,730 12 3	£556 8s. 8d. Agricul- ture Mortgage Cor- poration Ltd., 4½% Debenture Stock, 1961/91, at cost (James Cranston Bequest)	540 8 10	
50				£55 Hampstead Gar- den Suburb Trust Ltd., 5½% Deben- ture Stock at par value	55 0 0	
	WILLIAM WILL } E. MUNRO RUNTZ }	} <i>Treasurers.</i>			1,227 13 3	1,228
				Debtors	204 5 0	179
				Cash at Bankers	298 14 0	369
<u>£2,776</u>			<u>£2,730 12 3</u>		<u>£2,730 12 3</u>	<u>£2,776</u>

Report of the Auditors to the Council and Fellows of the Royal Society of Arts.

We have examined the above Balance Sheet, dated 31st December, 1947, and have obtained all the information and explanations we have required. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Fund's affairs according to the best of our information and the explanations given to us, and as shown by the books of the Fund.

5 London Wall Buildings,
London, E.C.2.

DELOITTE, PLENDER, GRIFFITHS & CO., Auditors.

ANNUAL GENERAL MEETING

The Council hereby give notice that the One-hundred-and-ninety-fourth Annual General Meeting, for the purpose of receiving the Council's Report, and the Financial Statements for 1947, and for the election of officers, will be held in accordance with the Bye-laws, on Wednesday, June 30th, at 3 p.m. at the Society's House.

(By Order of the Council),

KENNETH WILLIAM LUCKHURST, *Secretary*.

THE SOCIETY'S ALBERT MEDAL FOR 1948

With the approval of Her Royal Highness The President, the Council have awarded the Albert Medal for 1948 to Sir William Reid Dick, K.C.V.O., R.A., "for National Memories in Living Stone". A photograph of the recipient appears on page 419. Her Royal Highness has graciously consented to present the medal to Sir William Reid Dick at Buckingham Palace on the 1st July, 1948.

FACULTY OF ROYAL DESIGNERS FOR INDUSTRY

The following new appointment has been made to the Distinction of "Royal Designer for Industry" (R.D.I.):

CHRISTIAN BARMAN (Design for Transport).

MEETING OF THE COUNCIL OF THE FESTIVAL OF BRITAIN 1951

As reported in the last issue of the *Journal*, Her Royal Highness The Princess Elizabeth on 31st May attended, as President of the Royal Society of Arts, the first meeting of the Council of the Festival of Britain, 1951, in the Society's Lecture Hall.

It is hoped to reproduce a photograph of Her Royal Highness speaking in the next issue of the *Journal*.

The Princess was received in the entrance hall by the Lord President of the Council, the Right Honourable Mr. Herbert Morrison, M.P., General Lord Ismay, Sir Harry Lindsay and Mr. Gerald Barry. She then proceeded to the Lecture Hall where the other members of the Festival Council were presented to her.

Her Royal Highness opened the proceedings in the Lecture Hall with the following speech:

"Six months ago I had the pleasure, as President of the Royal Society of Arts, of visiting this House and of re-opening this beautiful Lecture Hall. It is again as President of the Royal Society of Arts that I come this afternoon, to welcome the Chairman and Council of the Festival of Britain, 1951, to their first meeting. This Festival is being organised to celebrate the centenary of the Great Exhibition of 1851; and it was here in this building, approximately a hundred years ago, that the Great Exhibition was planned, under the inspiration of my great-great-grandfather, the Prince Consort, who held the office which I am proud to hold to-day.

"It is well that there should be this link between the two events. The 1851 Exhibition laid special emphasis on promoting the arts and sciences and on the application of the arts to industrial design; and it should be our object to do the same in 1951. The Festival will not be confined to London, but will be spread

throughout the Kingdom. It will be designed to display to our own people and to visitors from all over the world what a wealth of ideas and achievements Great Britain has produced in the realm of art and science. I hope 1951 will be a summer of festival which the whole nation can enjoy and in which as many as possible can share.

"At a time when the world is racked with uncertainties there is a special virtue in dwelling upon the arts of peace. It is good to turn our minds to those things in our tradition that are permanent and continuous, through which our country has added so much to the store of human happiness and knowledge. To keep our freedom to live and think as we believe best, we have made heavy material sacrifices in recent years; but, as I said recently in Paris, we have certainly not forfeited our opportunities of leadership in the world of ideas. It seems to me that the present places a greater obligation upon us than ever before to concentrate on quality, in things of the mind no less than in what our factories produce.

"I would therefore suggest to you, as you begin your work, the importance of setting the highest standards in everything you plan for 1951. The success of the Festival will depend on the courage and vision shown by those responsible for its organisation. I feel sure they will never be content with what is second-best. This lays a special duty on our craftsmen and manufacturers to ensure that the design of all goods which are displayed in 1951 can bear the scrutiny that the eyes of the world will turn upon them.

"I hope, also, that in emphasising our achievements of the past and present you will stress no less sharply our responsibilities to the future. Then the Festival of Britain, 1951, may prove to be not simply an end in itself but a beginning of many good things; and it may be an event which by its excellence permanently raises the regard in which British artists, scientists, craftsmen and technicians are held.

"I wish you all success in your task. I shall watch its progress with interest".

When she had finished, Mr. Herbert Morrison, as Minister responsible for the Festival as a whole, said that side by side with the Festival, with its emphasis on the things of the mind, the British Industries Fair would stage a special display which he hoped would worthily present the achievements of industry in the centenary year. He looked forward also to the spontaneous organisation all over the country of other events within the field of the Festival or complementary to it.

The decision to hold the Festival was an act of faith in the ability of Britain to overcome its immense economic difficulties, and of faith that by 1951 we should have mastered them and be able to present to the world a smiling face of honest pride in a job well done.

Lord Ismay said the fact that they would not have unlimited resources at their disposal was a challenge to artists, scientists, designers, and craftsmen to prove that skill, ingenuity, and quality were far more compelling than size, ostentatious splendour, or quantity.

After these speeches Her Royal Highness left, and the Council moved into the Society's Council Room to continue their meeting. At the commencement of this

meeting Sir Harry Lindsay, Chairman of Council of the Society, made the following speech:

"I am grateful to you, my Lord Chairman, for this opportunity to say a few words to the Council on this happy occasion, and on the initiation of our joint work. I will not waste your time by repeating, on behalf of my Council of the Royal Society of Arts, the pleasure which we all feel in welcoming you to this historic building. That welcome has already been expressed to you by our President, and it would be an impertinence on my part to try to repeat what Her Royal Highness has already said so happily and so graciously.

"Instead, let me try to interest you in a twofold episode in the life of the Society which I have the honour to represent on your Council. The first episode runs like this. In 1845 a Committee of the Society suggested that steps be taken for the establishment of a national exhibition of the products of British industry. Our then President, the Prince Consort, took up the suggestion. Hyde Park was considered as a suitable site. It was decided to hold in the Exhibition Room (now the Library) of this building one or two small preparatory exhibitions of 'useful objects calculated to improve general taste', with an offer of prizes for good design and workmanship.

"The first of these preliminary exhibitions was held here in 1846, with rather poor response, redeemed by the success and popularity of one exhibit, the Felix Summerly tea-service designed by my remote predecessor in office, Sir Henry (then Mr.) Cole. The exhibit seems to have given rise to the epigram that the 1851 Exhibition started from a tea-cup.

"A more successful exhibition was held here in 1847, with 20,000 visitors; another still more successful—73,000 visitors—in 1848; for the fourth, in 1849, the Society's premises proved quite inadequate.

"Meanwhile, in 1848, a deputation of the Council of the Society had waited upon Mr. Labouchère, then President of the Board of Trade, and suggested a still greater effort to be made during a later year, which was finally adopted as 1851. The Prince Consort backed this suggestion strongly. A Royal Commission was appointed and the exhibition was held in Hyde Park in 1851 with enormous success which was largely the result of the genius and inspiration of His Royal Highness.

"They say that history repeats itself. Episode the second begins with a discussion in the Council of this Society held during the war, in 1943, when the need for planning a centenary exhibition in 1951 was first mooted. In 1944 we set up a committee to consider the matter, under the chairmanship of Lord Samuel. In 1945 the Commissioners for the 1851 Exhibition were interested in the project, and in the same year a private luncheon, over which our then President the late Lord Bennett presided, and at which your colleague and Director-General, Mr. Gerald Barry, was an honoured guest, carried the discussion further.

"In 1946 the Ramsden Committee reported favourably, but matters hung fire that year. In 1947 some 150 societies were invited to send representatives to attend a conference held in our Library. The proceedings of that conference, which generally favoured the scheme for a 1951 Exhibition, were communicated to the Lord President of the Council, who asked the Paymaster-General, Mr. Marquand,

to receive a deputation of the Royal Society of Arts Council to discuss the pros and cons of project, site and year.

"The rest of the story is known to you all, the favourable decision of the Lord President, on behalf of His Majesty's Government, the appointment of this Council, and this our first meeting.

"That is all I have to say, my Lord Chairman. I feel sure that this little story, under the title 'How History Repeats Itself', will assure you yourself, and my colleagues on this Council, how gladly the R.S.A. welcomes the formation of this Council and how ready is the Society to co-operate with you in your work. With the assistance of the Council of Industrial Design and of the Faculty of Royal Designers for Industry, we are organising an experimental Exhibition of Industrial Design at The Royal Academy this autumn, to which you will all be most welcome. You are already assured of the gracious sympathy and support of Princess Elizabeth in all that relates to the 1951 Exhibition. If there is any direction in which the Royal Society of Arts can contribute to the success of your labours, you may certainly count on our warm and active co-operation".

AFFORESTATION AS A WORLD PROBLEM

By H. G. CHAMPION, C.I.E., M.A., *Professor of Forestry, Oxford University*

Sixteenth Ordinary Meeting, Wednesday, March 17th, 1948

Dr. J. L. SIMONSEN, D.Sc., I.R.S., *Director of Research, Colonial Products Research Council, in the Chair*

THE CHAIRMAN: I think the sole qualification that I have for taking the Chair to-day is that at one time I had the privilege of being a colleague, unfortunately for a very short time, of our lecturer, Professor Champion. The University of Oxford has been very wise in its choice of Professors of Forestry, having drawn upon the Indian Forestry Service for all those professors—namely, the two predecessors of Professor Champion, Schlich and Troup—and it has in Professor Champion, I am sure we will all agree, not fallen away from the high standard which it has set in that Chair.

Perhaps it is not too generally recognised how integral a part timber plays in our lives, whether it be in our daily newspapers or in rayon stockings, or in the timber used for building our houses. Therefore, I think there can be no doubt that at the present time it is a very important subject about which we are looking forward to hear to-day.

I have very great pleasure in calling upon Professor Champion to deliver his lecture on "Afforestation as a World Problem".

Professor H. G. CHAMPION, C.I.E., M.A., then presented his paper.

Curiously enough, the term derived from the word forest, that is used to convey the concept of clothing treeless land with a forest cover, has not yet reached a settled form, and in conversation and literature may still be met with in four variants: forestation, afforestation, reforestation and reafforestation. The last two forms do indeed imply a previous forested condition, but in practice this is often only conjectural, and the first two include the others without reference to past history. In the present paper, we shall use the word afforestation except where we wish to stress the fact that we are only restoring the forest cover that has been relatively recently denuded.

The majority of us pay little attention to the changes that have taken place in the past in the natural vegetation which covers most of the land not taken up by buildings, roads, gardens, mines or agricultural crops. We are barely conscious of the fact that in Britain almost every acre of cultivation and bare land—except on the hill tops and in the fens—has been cleared from the forest which once covered nearly the whole surface; nor is it generally realised that Nature would, in the course of a century or so, reclothe it in forest were we to be removed. The archæologist and the historian know that this clearance of the forest has been going on throughout the centuries that have elapsed since the Stone Age and the first settled agriculture, though its pace has varied considerably. The industrial demands, growing population, and improved transport facilities of the last century or so brought about further destruction, and had left us at the beginning of the twentieth century practically without any large block of productive forest; even so, the two world wars have resulted in the denudation of some 20 per cent. of what was left. From being a country almost entirely under forest, England has now a lower proportion than any other in Europe, a mere 5 per cent. of the total surface, though owing to the prevalence of trees in hedgebanks, parks and gardens, this fact does not in most parts strike the visitor.

Most of the Western European countries also lie in the same natural forest region as Britain, and the following table shows the approximate proportion of the land that is still under forest:—

FOREST AREAS IN WESTERN EUROPEAN POSITION IN RELATION TO LAND SURFACE AND POPULATION

Country	Population Millions	Forest Area Million acres	Forest Per cent.	Forest per caput Acres
United Kingdom	48	3.0	5	.07
France	41	26.2	19	.64
Netherlands	9	0.5	6	.06
Germany	69	31.5	27	.45
Switzerland	4	2.2	22	.52
Italy	44	14.5	19	.33
Sweden	6	57.8	51	9.12
Finland	4	60.2	64	16.18
EUROPE	392	331.5	26	.85
U.S.S.R.	178	2400	45	13.6
INDIA	388	206.5	19	.52
CHINA	452	165	8	.36

(Figures from *Forestry and Forest Products*, F.A.O. 1947)

Western Europe is densely populated and has long been so, and it will be interesting to see what has happened in both the more recently settled regions of the world, and the sites of the more ancient civilisations. Let us firstly look at the Mediterranean areas of the Roman and Greek civilisations. The published figures for the modern countries of Italy and Greece are both 19 per cent. forest, which

appears fairly satisfactory; the distribution, however, is very unequal and in the more easily accessible parts the figure is much lower. We also have to bear in mind that we are dealing with a type of forest growth quite different from the mixed deciduous hardwood and coniferous forest of Western Europe and with a different climate. We have here to do with a less luxuriant type of forest in which olive and evergreen oaks are characteristic with locally a varying amount of one or two kinds of pine. The traveller on the Adriatic or Aegean coasts will notice that the hill-sides carry scattered bushes or stunted trees rather than growth for which forest would be an apt description; it is indeed difficult to decide at what point such growth may reasonably be deemed forest. Our traveller will also note that everywhere between the stunted trees, rock or soil is visible, that much of the surface is in fact bare, and that the general appearance suggests that the trees and bushes are losing ground.

Before Greece were Egypt, Syria and the Middle East. Egypt is not a forest country and such timber as it used in olden days was imported by water; its demands fell, in fact, on the neighbouring countries including Palestine, as indeed did to a significant extent Roman Italy. This ancient trade in timber is of much interest, but is only now receiving appropriate attention.

What is the position in Palestine, Syria, Lebanon, Iraq? Admittedly a good deal of this region is climatically unsuited to forest growth and there has perhaps been some deterioration of climate which we need not attempt to ascribe to the destruction of former forest, but there is no question that forest denudation has taken place on a great scale. The present picture in Palestine with 7 per cent. forest of sorts is at once suggestive of the end phase of the process going on along the northern shores of the Mediterranean. In Iraq (5 per cent. forest) we get more of the same thing, but on the great alluvial plains of the Euphrates and Tigris conditions are rather different, and thorn scrub and semi-desert occupy the cornfields of ancient times, as also still further east along the Indus.

Judging from what we know to have happened in historic times, there was probably an ebb and flow, the forest being pushed back in times of peace and prosperity, and reoccupying some of its former territory during war and pestilence, but almost always the tide has once again ebbed still further than before, though there are instances as in Ceylon, Yutacan, and Ankhör, where the forest has won and submerged the old settlements.

Turning to recent times, how does the matter stand in America, in Central and South Africa, and in Australia? The fact that the forests of the Eastern States of the U.S.A. have largely been cleared for farming, or in the course of logging operations, is common knowledge, though it is not easy without a good deal of travelling to get a clear picture of the actual position. Most of the commercial timber has gone, but much of the hardwood area carries regrowth and with reasonable care may come back into production. The position in the coniferous forests depends largely on the extent and frequency with which forest fires have occurred. On the great area of abandoned worked-out farms, recovery is very slow and only after centuries is the forest likely to regain its original state. Unfortunately, destructive logging and burning is still going on in parts of the Western forests, a process which war-time conditions have inevitably accelerated. Australia and New Zealand present variations on the same theme.

In the tropics the main cause of forest destruction has been the practice of shifting cultivation. It has been estimated that 1,000 square miles of forest were being so destroyed annually in Nigeria. Throughout Africa, we are seeing the accelerated denudation which is associated with the stopping of inter-tribal warfare, the introduction of medical services, etc., and the consequent rapid increase of human populations and live stock.

This pressure on the forest is, of course, just the result of the general increase of demand on the land, and is inevitable except where requirements can be met from grassland or by irrigating the desert or draining the swamp.

We may next note the nature of the vegetation which may clothe the soil when the forest cover is removed, if, indeed, the soil does get or retain a cover at all. Under Western European conditions the most typical vegetation, at least wherever the soil has acid tendencies, is heathland. Most of the heaths of Britain, and those of the plains of North Germany (e.g. the Luneberge Heide) and the Low Countries are on old forest land—often oak forest. Grass is more typical on basic soils as on chalk and limestones. Grass and heather are both often maintained as such indefinitely by annual or periodic burning. More fertile soils show a much more marked tendency to revert to forest as may be seen on neglected pastures which gradually turn to thorn scrub in which trees ultimately get established. On light sandy soils, however, particularly along the coasts, destruction of the forest results in the blowing of the sand and the formation of sand dunes to which we shall refer again later.

In the tropics, grassland is again the typical successor to denuded forest over a fairly wide range of conditions and similarly tends to be perpetuated by the burning which is common practice for a variety of reasons. Where conditions are arid, however, the grass is unable to form or maintain an adequate protective cover to the soil and again sand dune formation may follow—the finer and better soil constituents being lost as airborne dust—whilst the vegetation is likely to take more and more the form of drought resistant thorny desert scrub. At the other extreme, with a moist climate and soil, broad-leaved regrowth may rapidly recover the ground and gradually develop into secondary forest.

We have already seen how clearing for cultivation, logging for timber, and burning, all destroy the forest, the soil cover being changed for some other type of vegetation, or lost more or less completely. We have not, however, made it clear how important a factor the grazing of domestic cattle may be. In all but the wet tropical forests, grazing is liable to be second only to direct human action as a forest destroying agency, goats being by far the most destructive owing to their preference for tree foliage over grass and herbage. It is not only through the gradual prevention of all tree regeneration by direct browsing that the forest is destroyed, but the trampling effect on the soil often makes it unsuitable for tree seedlings, and the graziers very usually set fire to the forest grazing grounds and often lop the crowns of the larger trees out of reach of the cattle and even fell or girdle them to get more grass or to use them for fuel. The forest will hold its own against fairly heavy grazing but in many parts of the world, as in the Mediterranean countries, in most of India, and in much of Central Africa, the head of stock has increased beyond the carrying capacity of the land and the consequences are far reaching.

So general has this denudation been that the proportion of the land surface of the world carrying forest has been reduced to one-quarter from perhaps three times that figure. There is hardly a country in the world where some afforestation is not required if only to redress a defective distribution of an otherwise adequate forest area. There are numerous countries, notably in the Middle East, where extensive afforestation is a *sine qua non* to a permanent improvement in living standards, whatever additional steps may be needed. And there are other countries where the replanting of hundreds of thousands of acres is required as an anti-erosion measure, to conserve water supplies, or to bring unproductive land into proper use.

The effects of forest denudation fall into two main categories, corresponding generally to the predominance of the two chief values of forests to the human race, viz., the *production* value for that essential material wood, and the *protective* value. Forest produce, notably wood, is now recognised as an essential requirement for one of the basic freedoms, from want. Food alone is not enough, for we need also shelter and warmth, and for these the big majority of mankind are mainly or entirely dependent on wood. The importance of the beneficial effects of a forest cover on soil, water supply, local climate, and on the processes of erosion have only recently come to receive recognition and must be at least briefly reviewed.

Shortage of timber and wood fuel consequent on forest destruction is most acutely felt by rural communities who cannot draw on distant supplies, and they are driven to use vegetable and animal waste in its place, materials which it is usually essential to return to the soil to maintain its fertility for food production; they will also even dig up the roots of the shrubs, and grasses that have succeeded the forest, thereby greatly increasing erosion with all the calamities that it brings in its train. But shortages are not just local in the modern world and it is repeatedly claimed that we are rapidly exhausting world supplies, i.e., that the current drain exceeds growth. The latest figures show that in 1946 Europe was cutting 21 per cent. more, and even in the U.S.S.R. the cut about equalled the growth in the accessible forests. In Canada, despite its vast areas of forest, there was little or no balance, whilst in the U.S.A. (with perhaps 150 times Great Britain's forest area) the drain was almost 50 per cent. more than growth.

These figures might easily be interpreted too pessimistically for in most of these countries there are possibilities of considerably increasing the yield per acre by good management, but demands are of course also rising with increasing populations and standards of living.

On this last point it should be noted that in the countries with high standards the average consumption per head is about 20 cub. ft. of lumber plus about the same amount of wood fuel, etc., which is the production of about 1 acre of average managed forest, or up to five or six times that area of typical unmanaged or mismanaged forest. The population of the United Kingdom have only 0.1 acres per head, and of France 0.6. India also has about half an acre but it is badly distributed and per caput consumption is only under 0.2 cub. ft. lumber and 1 cub. ft. fuel. These figures should suffice to show the existing shortages, but it may be remembered that the remaining forested area of the world is still enough to include between 3 and 4 acres per caput of the world population, which even with relatively

low production should be enough to supply our wants several times over, were it suitably distributed and effectively managed.

Of the indirect effects of forest cover, there is no doubt that soil protection is the most important. The soil that is protected from erosion by a forest cover, of course, mainly remains on the site, and is utilised by the forest, and so is ordinarily not available for other forms of use such as food production, but by conserving the soil in water catchments, the water supply is regularised and becomes more available for use and at the same time the disastrous silting up of reservoirs and river beds, abnormal floods and river erosion and covering of fertile soil by sand and gravel are all avoided or greatly reduced. We are now aware of the great danger attaching to the denudation of the head waters of our river systems and the urgent need in many places of restoring their tree cover as soon as possible where it has been denuded. The importance of blocks and strips of woodland, to protect the soil from wind erosion, agricultural crops from damage by violent winds, and some crops such as cocoa from desiccation, is now generally recognised, and has led to the launching of afforestation works and schemes of which we must next make a brief review.

The immediate objectives of the larger afforestation undertakings of the world, set down roughly in historical order, are:—

1. Stabilisation of moving sand threatening fields and dwellings.
2. Increasing supplies of timber and fuel where these have become inadequate for local needs.
3. Stabilisation of denuded hill-sides liable to landslips and avalanches.
4. Conservation of soil in hilly country and land liable to ravine formation.
5. Protection against injurious wind effects on agricultural land and buildings.
6. Bringing into productive use waste lands capable of supporting tree growth, such as heaths, moors, and poor grassland, or desert land and bogs.
7. Raising of timber to supply industries or an export trade, or to build up living reserve stocks of timber as insurance against shortages.

Perhaps the best way to get a picture of what has been accomplished, what is being done or planned, and what needs to be done, is to take representative examples for each of these seven categories.

First, the sand dune problem. The Landes of Gascony provide the classical example which forced itself on the attention of the French Government in the middle of the eighteenth century, and gradually a vast tract of 350,000 acres of unhealthy waste land continually spreading over fields and villages, was clothed in pine woods, the moving sand fixed, the health of the people greatly improved, a good financial return obtained, local industries established, and an export trade built up in pit props and resin products. Extensive afforestation of the same kind has been done round the North Sea and Baltic coasts as well as locally in the Mediterranean and still more locally on tropical coasts. A vast amount remains to be done, not only along coasts but still more on the fringes of deserts where denudation of former forests has exposed the soil to wind action.

It has been the general history of the older settled countries that forest destruction has gone on unchecked until growth could no longer meet demand for timber and

fuel. The protection and efficient management of the residual forest area has sometimes been adequate to meet the situation, but very generally it has been necessary to supplement this by afforestation work. This has been most usually done on very degraded forest land, sometimes by special techniques on non-forest land as we shall note later. Much more of the woodland of this country than is generally realised has originated in this way, and similarly on the continent and in Japan. It is to-day the big problem in most of India and China, and many parts of Africa. It can be said that this is now recognised by Governments, but that so far very little has been accomplished and progress is very slow. As forest distribution, is usually unsatisfactory even where the total area is more or less adequate, this is a problem for every country which does not possess not only other sources of cheap building material and fuel, but also good communications to facilitate distribution, and economic status high enough for the people to buy their requirements. So the creation of fuel plantations near centres of consumption is a pressing need in very many countries. In India alone the need runs to millions of acres—Sir Herbert Howard puts it at 30 to 60 million.

In the hill and mountain ranges of Western and Central Europe, forest denudation on the slopes has sometimes been followed by destructive avalanches and landslides, sweeping away buildings, even whole villages, burying fertile fields, damming rivers, and so on. The task of refixing these slopes, controlling the mountain torrents and connected operations, involves extensive engineering work and is very expensive, but the work and cost have to be faced. Such projects have always included reforestation as part of the stabilising technique and as the one form of land use which will minimise future risks, and at the same time, bring in some financial return. Cyprus has done good work of this type and much may be seen in the French Alps and Pyrenees.

Soil conservation has belatedly attracted much attention during the last two decades, only after incredible amounts of unnecessary destruction had occurred and the disastrous consequences could no longer be ignored. Water erosion in hilly catchments and uncompacted soils liable to deep gullyng has beyond all dispute been enormously increased by denudation of the forest cover and already a very large total effort is being directed in Europe and North America towards reclothing the hills. The lands of the older civilisations, Palestine, North-western India, China, provide the most striking examples of the destruction, but unfortunately not of the reconstruction, though valuable beginnings have been made. Viewed purely from the direct financial returns to be expected from the afforestation of these denuded lands, afforestation projects are not attractive, but that they are necessary in the general interest is rarely disputed. Here again, the problem is one affecting many millions of acres.

Soil is liable to erosion not only by moving water but also by wind. All the world knows of the dust storms, actually the real fertility of thousands of acres of land going with the wind, which have of relatively recent times afflicted part of the U.S.A. Admittedly much of this land was originally natural grassland rather than forest, but much of it had been under forest and the most effective remedy has been found in a modified form of afforestation in which the farmer gives up strips of field and pasture, running mainly across the prevalent wind, and plants them up

to trees. The evidence is clear that the protection afforded against drying and erosive winds more than compensates for the loss of area cultivated and the competitive effect of the trees; in fact, cultivation could in many places not be continued without these shelter belts. The magnitude of the Great Plains Shelter belt project has often been misrepresented but it is no small affair; in the latest available report we are told there were 11,000 miles of strips of varying width, mainly raised by the farmers themselves with State help and encouragement. Work of this kind on a big scale has been done in the Ukraine on the borders of the Steppe country for nearly a century and an even bigger long-term plan has been launched recently.

We have next to consider bringing into production land capable of carrying tree growth which has been degraded by mistreatment, typically old logged, burnt and grazed forest land, but including heathland, moorland and some grassland which may not have carried forest for centuries and also land requiring drainage or irrigation before it can support forest. Examples might be taken from almost any part of the world. Britain has begun on a programme of afforesting some 2 million acres of land, mainly heaths and moors. In the U.S.A. the Lake States alone, (Michigan, Wisconsin and Minnesota) have about $5\frac{1}{2}$ million acres plantable land. Pre-war Germany was engaged on a programme of this type designed to eliminate timber imports. Forest-rich Sweden and Finland are paying much attention to drainage and afforestation of their relatively extensive areas of bogland. India has already afforested 60,000 acres of desert or semi-desert land with the help of irrigation.

Much of the reforestation in the U.S.A. and the plantation work in South Africa is done with the object of improving timber supplies—and tanbark also in the latter country. Kenya has a big development programme envisaging a future export trade. The extensive exotic (mainly pine) plantations in New Zealand of the last 25 years covering some 860,000 acres have had the same objects in view and owing to the rapid growth obtained are already producing large volumes of timber for use as such and for pulp products.

The last category for consideration overlaps the one just referred to, being afforestation for the direct purpose of increasing timber stocks for current use and as reserves. It is really the key point of United Kingdom forest policy, as on our programme, we hope, in 50 years' time, to have enough productive forest to constitute a stock adequate for all requirements for an emergency lasting several years.

It is not possible to give precise figures for the afforestation work already done in the several countries, nor for the extent of land needing afforestation. We have, however, seen that there is hardly a country in which this work is not called for, since unsuitable distribution of forests leads to local shortages, even where the total forest area appears more than enough. In most countries, moreover, the need is urgent and, coupled with protection of residual forest, afforestation should be pushed ahead as a measure that will certainly improve conditions and raise standards of living; and indeed it is a measure, any neglect of which by us will be severely condemned by future generations.

DISCUSSION

THE CHAIRMAN: We have listened to a very masterly exposition by Professor Champion of the dangers which we are likely to incur if we neglect afforestation. We are obviously using up our capital at a fearsome rate. Not only are we suffering from this grave shortage of timber—we even read, for example, that they are short of paper in the United States—but there are the other very grave risks that we incur, such as land erosion. This was brought home to me very clearly also some eighteen months ago when I travelled over a good deal of East Africa by air, and could see only too well, even at that height, land covered with scrub where there had been cultivation following burning, or simply bare patches of very deeply eroded land.

There is only one question I should like to ask. Can bamboo be used at all in checking land erosion? I ask this because bamboo has a quick rate of reproduction and because the cellulose content of the timber can be used as a source of cellulose badly required for the rayon industry, the shortage of which is already being felt. I wondered whether there is a possibility of getting a quick-growing thing like bamboo which would, at the same time, prevent erosion.

Professor H. G. CHAMPION: I do not know of any occasion where bamboo has actually been used in this counter-erosion work, except in Japan, where they have, I believe, used it to a certain extent. It is not a very easy type of plant to deal with. The majority of the species are limited to regions of moderately good rainfall. There may be heavy losses from drought, even with the more resistant species, and there are one or two minor difficulties, such as the irregular availability of seed—a rather important point. There are, however, some cases, with favourable conditions, where one can raise bamboo directly from cuttings or even bury the bamboo and get a hedge of plants; but they are exceptional cases, and on the whole I would say that there is not much likelihood of bamboo becoming much more important for this purpose.

Mr. W. S. DAHL: Some two years ago I was travelling in Finland in the winter, and the whole way up the coast of Finland there is bare land. They cut down, first, all the trees suitable for building timber, and do not replant, and then they cut down the balance of the trees for pit-drops. Consequently there is nothing but waste land. I think they are trying to rectify that state of things now, but that was a very grave mistake, was it not?

Professor H. G. CHAMPION: Certainly. The Scandinavian countries have made tremendous progress in the management of their forests during the last few decades. We usually quote Finland because Finland provides us with the only example where a forester has been the head of the State.

There are strict regulations about all fellings in all Scandinavian countries. The nature of the felling has to be approved. There is still, however, I am afraid, both in Sweden and in Finland, a good deal of unwise felling of the type you have mentioned.

Mr. W. S. DAHL: I gather that in the big forests in Finland there has to be a very expert man to examine the trees and pick out which ones are suitable for felling and which are not. I suppose it is a question of the age and the space to be left in between them. They do not cut down all of them and then replant. They cut one here and another there, and leave some standing.

Professor H. G. CHAMPION: One has to have a great deal of patience in the Scandinavian countries, because the rates of growth there are very much slower than ours. You can see how much less favourable growth conditions are when you look at pine trees such as are cut down and brought to this country from Finland and Northern Sweden; you will find that the timber is ordinarily 250 years old, whereas in this country it would be 60, 70 or at most 100 years old. That means that not only do the standing trees grow much more slowly, but the young trees in areas under re-generation also proceed much more slowly.

What they are trying to do in the northern territories of both those countries is to prevent the clearing of any large tract. As long as the clearing is not large, pine seed is blown freely with the wind and will drift in, and—provided they do not burn, and fire is not a very serious proposition there—the forests will gradually seed up again. If they were to clear 50 acres in a block, it would take centuries before they would get the forest back. I think the beginning of improvements can be seen there, but they have still a long way to go.

THE CHAIRMAN: I should like, on your behalf, to propose a very hearty vote of thanks to Professor Champion for sparing the time to come here to-day and give us this lecture. I am afraid that we can hardly say we are really forest-minded in this country, but possibly as the outcome of our present shortages we may have more sympathy with those who try to replace our long-lost forests.

The vote of thanks was carried by acclamation.

After a vote of thanks to the Chairman had been carried, the meeting then terminated.

THE BURMESE VIEWPOINT

By the REVEREND G. APPLETON, M.B.E., M.A.

India, Pakistan and Burma Section, Thursday, April 1st, 1948

Major-General SIR HUBERT E. RANCE, G.B.E., C.B., *in the Chair*

THE CHAIRMAN: We have a great pleasure in store for us this afternoon when the Reverend George Appleton will read a paper on the Burmese Viewpoint.

I can think of no one who is better able to describe the Burmese viewpoint than he. He has had unlimited experience in Burma, and when I went there as Governor he was holding the position of Director of Public Relations. During the general strike and the police strike of September, 1946, he was of tremendous value to me because of his great knowledge of the Burmese people and the Burmese way of thought.

I shall say no more now, but will ask him to read his paper.

The following paper was then read:

It is never easy for a person to get under the skin of people of another race and try to see things through their eyes. The intelligent and observant traveller can, after a few months residence in another country, write a descriptive interesting book, but the man who stays in for years in a country becomes less and less sure of himself, less and less dogmatic about his friends of the other race, less critical of those whom he studies, and ever more eager to understand than to criticise. He has, temporarily at any rate, to step outside his own environment, the history and ways of his own people, and envisage the possibility of other systems besides the one in which he has grown up, yet he must never completely let go his touch with his own people, their history and ways of thought, otherwise he will not be able to interpret the one to the other.

It is with considerable misgiving that I finally read this paper, more so as the visible situation changes so rapidly. Burma is living in a moment of upheaval—greater, perhaps, than at any other point in her history: a period of inner change within herself, and of equally shaking transition in the external situation, the setting in which she is set.

All the indigenous peoples of Burma trace their original home to the mountains of Tibet and W. Yunnan. There life was hard, and habitable living room small.

So there began some 2,000 years ago a migration down the great river valleys of Indo-China, to seek new homelands where the struggle against natural hardships should be less severe. Historians trace three great waves of migration, which included Pyus, Mons, Karens, Burmans, Arakanese, Chins, Kachins and others. Not only Burma was involved but the whole of Indo-China; for example, the main Shan migration passed on into Siam. But more races crowded into Burma than into any of the neighbouring countries, and until the arrival of the British in force the history of Burma is the story of the struggle for domination. It is not easy to discover that history, for written records are few and late. There are native histories, compiled at royal command, reflecting the traditions at the time at which they were written, yet we must not underestimate the power of memory and tradition in countries where written records were not the customary method of preserving the past. In recent years, however, under the industry and inspiration of G. H. Luce contemporary records have been deciphered and translated from the inscriptions of Pagan and other religious centres. It is much to be hoped that Mr. Luce will be able to write that early history of the Pagan period (1044-1287) which from the rich archæological records now available will reveal not only the historical events and dates which form the skeleton of history but the social life and outlook of the common people.

Burmans are only beginning to be conscious of their history in any historical sense. There is a wealth of myth and legend, appropriation of incidents from the Pali Scriptures—uprooted from Central India and transplanted to Burma—identifications of people and places which seem to have little or no foundation, all of which shows an interest in origins and value, which should produce keen historians, once they grasp the critical method and apply themselves to study the material available.

Pagan is an early history book, and in its 16 square miles of pagodas, a witness of past glory and a challenge to future greatness. I never go into a Norman cathedral here in England without remembering the great pagodas of Pagan—the That-pyin-nyu, the Ananda, the Gaw-daw-palin, which were being built in central Burma at the same time, and which rival the Norman work in massive strength and beauty.

Pagan is not only a monument of history, it is a tribute to the inspiration of Buddhism, at that time a comparatively new religion in Burma. The tribes who came down the river valleys into Burma were originally Animists, spirit worshippers. They feared the spirits of nature, the spirits of mountain, river, spring, lake, the spirit of the forest, the tree spirits of the great banyans, the spirits of disease, and the spirits of the dead. This is still the acknowledged religion of the hill peoples of Burma, and 900 years of Hinayana Buddhism has failed to displace it completely from the minds of the Burmans. It was said in the 1901 census report that Buddhism was a veneer over the solid basis of Animism, and Sir George Scott claimed that Buddhism occupied the thoughts of the lower class Burman only in his weekly visit to the pagoda, while the need to propitiate the *nats* was a matter of daily concern. These statements made 50 years ago would, to-day, be regarded as an exaggeration, but they bear witness to the struggle which Buddhism has had to make to displace its predecessor. Even to-day most Burman Buddhists have a small shrine

in their homes in honour of the *Mahagiri*, or house spirit, who protects the home against bad luck.

The survival of this popular belief in spirits gives rise to a whole system of superstitions, omens, charms, sympathetic magic and love potions, spiritualism, astrology and fortune telling. In the so-called rebellion of 1930-31, many villagers had themselves tattooed and needles embedded under the skin of the forearm, believing that this would make them invulnerable against swords and firearms. They were speedily and sadly disillusioned. But, even to-day, a credulous belief in auspicious and inauspicious days, puts the community at the mercy of ignorance and quackery, and when it gets into the minds of would-be leaders and executive councils it can be disastrous. Many of the younger men see its danger, and while having no faith in it themselves, acquiesce in it either as a means of exploiting a weakness of the "masses" to their own advantage, or out of fear of leaving such a still powerful weapon in the hands of their opponents.

In the eleventh century a degraded form of Buddhism was the recognised religion in the New Kingdom of Pagan, probably one of the Tantric magic-working sects which had entered Burma by the overland route from Tibet. This first overlay of the original spirit worship, indulged in superstitions and immoral rites, and it is possible that the superstitions and astrology, which I have already mentioned, derive from this decadent Buddhism rather than from the simple, more cleanly, instinctive animism. This decadent Buddhism was the religion of Anawrahta (1044-1077), the founder of the Pagan dynasty, until he came into contact with the pure Hinayana form from the Mon Kingdom of Thaton through Shin Arahan a missionary monk from the south. He was so impressed that he adopted it as the established religion of his Kingdom, appointing Shin Arahan as his Primate. It would seem that Anawrahta was under no misapprehension as to the difficulty of displacing the old religions for in the Shwe Zigon Pagoda at Pagan you may still see the wooden images of the 37 *Nats* of Pagan, which Anawrahta is said to have placed there with the remark "If they will not come for the new religion, they must come for the old".

Under the creative impulse of the new religion there began an era of temple building and religious enthusiasm, which has made Pagan one of the most impressive and famous archaeological treasure-houses of the world. How is it that a nation which could produce Pagan should have failed to continue its creative greatness? Was it the struggle for existence against the later waves of migration that pressed upon it from the north? Was it the enervating climate of the plains of central Burma after the hardihood and austerity of the original home in the mountains? Was it some change in climate that made central Burma unable to support such a demanding centre? Was the driving inspiration from Pyu and Mon architects and Indian builders rather than Burman? Was it some inner weakening of character, some inner disloyalty which led to the failure to continue the glory that was Pagan? Perhaps some day a fearless and penetrating Burmese historian will try to answer these questions, and by doing so give to his people principles for later greatness.

Pagan is comparatively deserted to-day, though more and more Burmans are becoming aware of its existence and past greatness. During the Japanese invasion and the liberation campaign a Burmese scholar (with Mon blood in his veins) Lu Pe

Win, made for Pagan, to do what he could to protect and preserve its treasures, and it is largely to his efforts that Pagan exists unscathed to be a monument of Burma's past glory, and perhaps an inspiration for the future.

So for 900 years the present form of Buddhism has been the acknowledged religion of Burma, with its monastery in almost every village, its pagoda on any hill of eminence, with its system of educating the boys—for no Burman boy is reckoned as a mature member of religion, or race, until he has become a monk for a period which may vary from a few days to a lifetime—with its holy-days of religious significance, or dedication of a pagoda, or quite frankly the commemoration of a *nat*—holy-days which are great social holidays. Buddhism has exerted a great influence on the people of Burma.

Its five great precepts—not to take life, any life, not to commit sexual impurity, not to steal, not to lie, not to take intoxicating drink—form a simple and stern code, which Buddhists fail to live up to, in the same way that nominal Christians fail to observe the Christian commandments. Yet such a code must have had a great restraining and moulding influence.

Buddhism is world-denying in its outlook: the ideal life can only be lived in the retirement from the world. In fact the aim of life is to get free from the endless chain of rebirth and so enter the Great Peace of Nirvana, which can best be done by becoming a monk. This has its effect on national life, for often the greatest spirits retire to the monastery, or a man who has safely launched his family in the world, may devote the closing years of this life to religion, just at a time when ripe maturity and wisdom might best serve the public weal. Thakin Nu, the successor to Aung San, not only in office but in spirit, wants to give up his post as Prime Minister to devote himself to religion. It might be urged that, just as Buddhas are people who defer their final entry into Nirvana for the sake of the salvation of men, so a Minister might resist the call to monastic peace for the sake of his nation so newly conscious of her full nationhood.

The ideal Buddhist is a gentle character, hurting no living creature, tolerant and kindly, doing blameless deeds, retiring more and more from attachment to worldly things, ridding his heart from the sway of all human passions. There are many men of ability, character and experience, who will have nothing to do with political life in Burma. If more of these men would be persuaded to enter and stay in public life, politics might be cleaner and the affairs of the state more just and peaceful.

Government officials have for many generations been regarded, with water, fire, thieves and people who hate you, as one of the five great enemies. This harks back to the times when officials were not paid a regular salary, but given power over an area or town or department of public life and expected to contribute a fixed sum to the King's Treasury. Taxes of any sort are never regarded with favour, and the tax collector is never popular, least so when the conditions of his post offer temptations to a greater surplus than is sufficient or just. The chief officer of a town was called *myo-sa* the man who makes his living by the town, but literally "the man who eats the town". Burmans, officials alike, will have to rid their minds of the old prejudice, and that at a time when government officials seem to be multiplying as a class throughout the world.

Geography has until recently made Burma a somewhat isolated country, shut off

by a horseshoe of mountains on the land side and restricted by the sea on which they seldom wished to venture. This isolation has meant an ignorance of world affairs, and perhaps an exaggerated sense of their own place in the world. The spire over the King's palace at Mandalay was called the centre of the Universe, and the extravagant honorific titles given to the King are evidence of that inward looking.

But if Burmans have been slow in going out to the world, the other races have not been slow in coming to Burma. From earliest times traders have come across the Bay of Bengal from S. India, Chinese over the passes from China for tribute and trade, and since the early sixteenth century adventurers and traders from the West, seeking in earlier contacts the gems, spices and teak, and in later years the metals, oil and rice in which Burma is so rich, all of them wanting to sell their manufactured goods in exchange. It is not only the British who have earned the doubtful compliment of being called a nation of shopkeepers. Before the recent war there were 1,000,000 Indians in Burma and 200,000 Chinese in addition to the 10,000 British, all hoping to make enough to build a little grey home in the West, or buy a farm in India, or equip a business in China. Nearly all the capital of industry was in British, Indian or Chinese hands.

The Burmese peoples are not lovers of money; they have been called thriftless and lazy. But they can work when necessary, as at seed-time and harvest, or when their imagination has been fired. But I doubt if mere money will ever fire that imagination. Why make work an end in itself? Why make money the chief value in life? But the business acumen of other races has awakened Burmans to the amount of wealth that is being taken away from Burma, even making allowance for the fact that Burma has indeed been enriched through such foreign enterprise. That, I believe, is at the bottom of the Burmese haste to nationalise her great industries, short-sighted and impatient though that haste may be. That is not the only factor—the need to feel confident that their new power is really theirs is another.

Burma's old-time isolation may be responsible for two other characteristics—the first is a lack of knowledge of world affairs and forces which may make them overestimate Burma's ability to stand on her own feet. Only a few of them know anything first hand of India, with its 400,000,000 overspilling into S.E. Asia, and with a great economic and industrial power; or of China, with 450,000,000 and her centuries-old dreams of Upper Burma, at least, being part of Greater China; Or, out of sight, of Russia reaching through China and hoping to penetrate into India for an all-Communist totalitarian world. It is possible that the semi-informed Burman has a more optimistic faith in other nations, or hopes that UNO will come to the rescue, or even that Britain will maintain a protecting interest. The second characteristic for which Burma's past isolation may be responsible, is the Burman's naive confidence in his own ability. Government and commerce seem comparatively easy when one sees them working smoothly, and at first one does not realise the discipline, apprenticeship and long experience that go into these two vocations, or indeed, any vocation. Burma is a young country in many ways; it is only just over 60 years since the end of the old Burmese Kingdom with its landlocked isolation in Central Burma, and its medieval ways. You have only to read contemporary accounts of King Thibaw's court, or Tennyson Jesse's novel "The Lacquer Lady" to get some idea of how far Burma has advanced in these 60 years.

With the incorporation of Burma within the British Empire in three steps in 1826, 1852 and 1886, came the fuller impact of western ideas of government, law, trade, industrial development and education. It was inevitable, I suppose, that there should be a break-up of the pattern of social life. The village is no longer the social unit, and the headman has become the lowest grade of government servant, the collector of taxes, rather than the leader of the village community. A new conception of law was imposed, an external code, impersonalised, capable of seemingly amazing results in the hands of clever lawyers, instead of something much less definite, but much more personal and effective and which reflected the conscience of the local community. This has had two disastrous effects—a decline in people's respect for law and the creation of a whole class of lawyers and pleaders of varying grades. Justice seems no longer to have her eyes bandaged so that she may be impartial; the wool is pulled over her eyes that she may be ignored or hoodwinked. The Hill Peoples, particularly the Chins and Kachins, have been less affected by the western impact, even allowing for the opening up of the recent Burma Campaigns; their social pattern, very different from that of the Burmans, still exists. It is much to be hoped that what is good in it, and there is a great deal, will be studied, preserved and developed.

Many of the older Burmans regret the decay of their old social structure—the respect formerly paid to parents, the place which the monastery used to hold in the lives of the young men, the failure to develop the monastic schools which had made Burma the most literate country in the east (with literacy figures of 62 for males and 18 for females, that is for the purely Burman race), though admittedly the test of literacy consisted of little more than being able to spell out the words in a book and sign one's name.

The system of monastic schools may be called the indigenous system of education. For many generations the monks in the monasteries have given instruction in the Buddhist religion and the three R's to the boys of the country, and in some cases to girls up to the age of ten. In 1936 it was estimated that there were 17,000 primary monastic schools in the country with 200,000 pupils. Many attempts have been made to make the monastic system the basis for the education of the whole country, but without much success. Often the teacher was the village monk or a protégé of his without any professional training; the monks were averse to any interference from outside; the parents liked a flexible system from which it was possible to withdraw their children for bird-scaring and cattle-minding, as the seasons for such came round. Possibly a purely Burmese Government may be more successful in adapting this traditional system to the needs of modern Burma.

They will need to avoid the mistakes that have been made in government and mission schools. The general criticism of education in Burma has been that it has been far too literary, with an emphasis on the passing of examinations. Seventy per cent. of the population of Burma have to earn their living by agriculture, and many more in occupations akin to agriculture, and if the aim of education is to fit children for life, some kind of rural vocational training is surely necessary. There has been virtually none of this either in the Teachers' Training Institutions or in the village schools. Perhaps we started at the wrong end—the top, with the high schools and university, in the towns—hoping that the process would permeate downwards,

instead of basing education in the village and working upwards. Much of the teaching in the middle and high schools of the towns has been in English, and until recently exclusively so in the university. It is doubtful whether anyone can begin to learn to think in a language not his own; he must be able to think first in his own language. Education has drawn children from the country to the towns, and its literary character has resulted in false standards about the value of manual work as compared with clerical or professional. Burmans blame Britain for all this, regardless of the fact that it is Burmese parents who insist on sending their children to the urbanised schools, and forgetful of the fact that in 1923 education became a transferred subject—since that time it has been mainly under Burmese control, though it must be admitted that until 1937 finance was not under popular control.

The development of the country towards self-government has been comparatively rapid. Upper Burma was incorporated in the British Commonwealth in 1886, and it took five years to pacify that part of the country. In 1897 a small Legislative Council was appointed, all its five members being nominated. This was enlarged in 1909 and again in 1915. Eight years later the Montagu-Chelmsford Reforms were extended to Burma, and a Legislative Council of 103 members set up, of whom 84 were elected. At the same time executive charge of certain subjects was transferred to two political members responsible to the legislature; these subjects included education, public health, agriculture, forests and local government. The final stage came, eleven years ago to-day, when the 1935 Government of Burma Act came into force, providing for a Council of Ministers on the British model, responsible to a bicameral legislature, in which all 132 members of the lower house were elected, 25 seats being reserved for minority communities. Five subjects were still reserved to the Governor—defence, external affairs, monetary policy, the Scheduled or Hill Areas and Establishment chaplains. At the same time Burma became separate from India, although in Whitehall the Burma Office was still under the Secretary of State for India, and Burmans were rather resentful of the vastly predominating official interest in India.

This advance did not satisfy ardent nationalists, although all parties up to 1939 agreed to work for complete self-government by constitutional means. But Burmans could never understand the British reluctance to fix a date for the hand-over of power.

The reservation of External Affairs to the Governor resulted in Burma becoming involved in the war against Germany without being consulted or given any choice, while the reservation of Defence to the Governor was destined to become a boomerang, for when Japan overran Burma in 1941-2 Burmans could claim with some justice that Britain had failed in her responsibility for Burma's defence.

Burmans too resented the reservation of the Hill Areas to the control of the Governor. When we remember the centuries of past struggle for the domination of the country we can perhaps understand Burmese feelings, though British policy claimed to be based on the wishes of the people of those areas, as far as they were vocal. Even the exclusion of established chaplaincies led to repercussions, for in the 1937 elections the cry was raised that Buddhism was to be brought under the Bishop of Rangoon. As in India it is still difficult for people not to identify race and religion, and from time to time there is an outcry against missionary activity as being a veiled and subtle method of "British Imperialism".

The new system had only been working for just over four years when the Japanese invaded Burma. In spite of three ministries in that short time good work had been accomplished, particularly in agricultural legislation, and a sound financial situation had been established. Within five months of the outbreak of the war almost the whole of Burma was in Japanese hands. A great deal was written in 1942 about fifth-columnism in Burma, nearly all of it untrue. A small party of young nationalists came in with the Japs, a number of others, mainly "bad hats", joined them. Government servants stood loyally to their posts, and many of them would have accompanied us to India had they been allowed to do so. There was next to no sabotage behind our lines. Generally, people were puzzled and sad. Later, I think it must be admitted, that the Burmans, as distinct from Karens, Kachins and Chins, acquiesced in the Japanese occupation, but the national life had to be carried on somehow or other. We British have never been successfully invaded since 1066, so we have got out of the habit of adapting ourselves, even mentally, to invasion conditions.

Burma suffered very badly as a result of two bitter campaigns fought throughout the whole length of the country; she was probably more damaged than any other country involved in the war. Not only material damage—docks, railways, inland shipping, oil and mining plant, the destruction of almost every town of any size, the complete cessation of the export trade resulting in cultivators only growing half their usual crop, desperate shortages of clothing, medicines, manufactured goods; but the disruption of education also, and spiritual humiliation. (It is no wonder to me that the Burmese people, despairing of any war compensation from Japan, are asking Britain for compensation.) Liberation brought great relief and joy, and no resentment for the damage to property and life inflicted by the efficient air force of the Allies.

A number of psychological factors are involved in this war period. First of all, we need to appreciate the effect on the minds of most Burmans of our inability to defend Burma against the invasion of the Japanese. Since Upper Burma was incorporated into the British Empire in 1886, Burma had not seen any war within her borders. There had been a long state of settled peace and development and the Japanese invasion came as a great shock. Hardly any Burmans appreciated the difference that the attack on Pearl Harbour made to the situation, and it was not until well through the war that we were allowed to know that the American navy was so badly crippled by the disaster of Pearl Harbour that the whole Allied position in the Far East was endangered and almost lost. The fact that an Asiatic nation was able to inflict temporary defeats, as we now know them to have been, on such powerful nations as the British and the American led to a great loss of prestige for the white race generally. Also, the Burmans realised that, although they were a comparatively small and unimportant nation (there are only 17,000,000 people in Burma), opposing Great Powers were competing for their support and for their raw materials, and that they could therefore play a quite important part in balancing opposing interests.

The Japanese gave Burma a nominal independence, which many Burmans at first believed to be the real thing. They accepted the Japanese claims to be giving freedom to "subject nations" and believed their talk about Asiatic brotherhood and co-prosperity. When they discovered that the Japanese were exploiting them, and

using them for their own purposes, there came with the disillusionment, I am fairly sure, a mental resolve that they would never be caught out in that way again. Therefore, after the first joy at the return of the British there arose a deep distrust of our motives. It was, I believe, a kind of defensive mechanism, yet this very disillusionment quickened their desire for complete self-government.

The post-war situation was thus marked by a tremendous wave of nationalism, which had started before the war and which is part of the great wave of nationalism sweeping through the East. For instance, government servants, who before the war took little interest in Burma, have now become politically minded, and that has been one of the great difficulties of the last years. This nationalism also shows itself in a new interest in anything Burmese, such as Burmese literature and Burmese history seen through the rose-coloured spectacles of a nationalist. Thibaw, whom Western writers regarded as a weak and cruel despot, is now looked upon as almost a hero of Burmese history. Young Burmans are eager to study the history of their country. Before the war we had the greatest difficulty in persuading Burmans to join the Burma Research Society; now they get hold of old copies of the Society's journal and re-write the material in their own way.

All these nationalist aspirations found a focus in Aung San, who had distinguished himself in his university days as the leader of a well-organised strike of university students. He then became a leader of the "thakin" group—"thakin" was the name given to a European, equivalent to "sahib" in India—and in 1940 fled from the country and was later joined by about thirty others. These young "thakins" accompanied the Japanese when they invaded Burma in early 1942. It is important to note that these young men were not so much pro-Japanese or anti-British as intensely Burman. Later, when they realised Japan's true intentions, Aung San and the small Burmese army, backed by an underground movement decided to come over to the British, a very courageous step when you realise their numbers, and their limited arms. Their exploits have been greatly exaggerated by Burmese writers, but I don't think British writers have adequately recognised the courage demanded to revolt, or possibly we have been jealous for the unswerving loyalty through defeat as well as victory of Karens, Kachins and Chins.

Aung San awakened a martial spirit amongst the Burmans, and the young men looked up to him with intense loyalty. In their new patriotism and hero-worship they were ready to undergo discipline and do hard work, two duties which in the past they had been accused of lacking. Aung San was a real leader with high ideals. I heard him say at one gathering that there were certain things he thought ought to be done, and he was going to do them, whether people followed him or not. At a great mass meeting at the Shwe Dagon Pagoda in January, 1946, some 20,000 people attended to hear him speak, I being one of them. It looked as if the stage was set for a carefully planned and timed entry of the leader, on the totalitarian model but when the time came Aung San passed almost unobserved through the people to the platform, and quietly began his speech. There was no ostentation, no rehearsed ovation. His speech lasted for $3\frac{1}{2}$ hours; most of it he read quickly in an even tone. There were surveys of history, patriotic passages, vitriolic outbursts, Socialist and Marxist doctrine, for the manuscript was a composite one. Occasionally Aung San put his manuscript aside, and then he spoke with fire and humour

It soon became clear that there was a struggle going on within his party, between the Communists, who wanted violent measures, completely unscrupulous, and the more moderate Socialists, aided by one or two older leaders who saw the promise of Aung San. In a review of the political situation written in the spring of 1946, I concluded with the statement "If Aung San can be detached from the Communists it will be a great day for Burma".

The Communists under two very astute leaders, had advanced their cause very considerably by working within the Anti-Fascist People's Freedom League and trading on Aung San's popularity. It was not till after Aung San and A.F.P.F.L. had victoriously entered the Governor's Executive Council in October, 1946, after an organised strike of police and government officials, that the split with the Communists came. When it did, Aung San and his friends were outspoken and firm, and Communist popularity waned, even in the country districts where they had organised cultivators' unions, advocated the non-payment of taxes and rent, and promised the confiscation of land and its division among the landless and debt-ridden peasants. I doubt if Communism will ever have any chance in Burma, unless by intimidation and violence, for the Burmans have no class distinctions to be inflamed, and they resent, as a slur against their national religion, the stereotyped Communist doctrine that religion is the opiate of the people.

Aung San's courage and leadership were shown again in January, 1947, when his political opponents, including the Communists, stirred up agitation against the London Agreement before Aung San had time to get back to Burma and explain the facts. He stood by his convictions and had little difficulty in keeping public confidence. Being in office had not been easy, for he inherited situations which he and his supporters created when in opposition. They had used the police in the political struggle and then found that the police were no longer reliable. They had backed up huge demands for cost of living allowances and then found that they had to find the money. They had insisted that their youth organisations should be organised on a semi-military basis, and other parties had followed suit. Through hard experience they were learning the price of government and the cost of leadership.

A further factor in post-war Burma has been the growth in the trade union movement, organised largely by the Communists and used by them to stir up trouble and further their own political designs. The Communists, however, would never have been as successful in their efforts had there not been real need for protecting the rights of workers, especially in regard to Eastern employers of labour. They were clever also in exploiting the cultivators, who became a most important class of worker through the food shortage in India and S.E. Asia. One could not help feeling in Burma that the rural population came a poor second to the people in the towns, especially in education and health measures, and during the reconstruction period in supplies of clothing and manufactured goods. The village people of Burma have done a wonderful piece of work in raising rice production substantially nearer to pre-war figures of 6,000,000 tons, of which roughly half was exported. In the harvest of 1946-47 there was a surplus of 1,000,000 tons, produced under great difficulties—scarcity of clothing, quinine, medicines, mosquito nets, and under

conditions of real insecurity caused by the prevalence of dacoits, well armed with weapons left behind by the Japanese.

Another important subject in post-war affairs has been the relationship between the Burmans (11,000,000) and the other indigenous races in Burma—Shans (1,000,000), Kachins (400,000), Chins (250,000) and the Karens (1½ millions). Shans, Kachins and Chins had up to a year ago been under the direct control of the Governor, while most of the Karens had been in political Burma. Burmans have always been resentful of this division; they have felt that all the indigenous races of Burma are of the same family, and they have not regarded with enthusiasm any plan that would leave their natural land frontiers out of their control. Up to recently the Hill Peoples have been suspicious, but the new attitude taken up by Aung San and continued by Thakin Nu has created an entirely new situation. The Hill Peoples have virtually been allowed to write their own terms into the constitution; the Kachins have their own State within the Union, including the important towns of Bhamo and Myithyina, the Chins have all the local autonomy they want within their area, the Shans seem satisfied with their State, and a Shan has been appointed as first President of the Union of Burma. The Karens are still unhappy and unsatisfied. They would like to have a Karen state of their own, but the majority of them live in the Irrawaddy and Tenasserim divisions inextricably mixed with the Burmans. They suffered very badly in the break-up in 1942 at the hands of some members of the Burma Independence Army, and they cannot yet forget or forgive. Gestures have been made to allay their fears, and the first two posts in the Burma Army have been given to Karens. But they are still unhappy and sore at what they regard as the failure of their British friends to stand by them. Here is a problem still to be solved, which needs all possible patience and wise leadership.

Law and order is another problem that the new Union Government has to face. Dacoity has always been prevalent in Burma, but flourishes in periods of upheaval and economic hardship. The Japanese left behind 50,000 arms in Burma, and though four-fifths of this was recovered by the army and the police, much of the remainder fell into the hands of the dacoits, who with automatic weapons and hand grenades were often better armed than the police. Part of the bother has been that there has never been any really vocal public opinion against the dacoit, often he has been looked up to as a kind of Robin Hood, though in reality he was brutal and violent. It took courage to stand up to the dacoit or to give news of his movements to the authorities; you needed to be quite sure that the authorities were strong enough to defend you against revenge. Also opposition to authority often had a pseudo-patriotic tinge about it; now that Burma is independent the dacoit will be seen as the enemy of society that he really is. The situation has improved considerably in the last three months. The Bishop of Rangoon in a letter, dated March 14th, written while on tour in the Delta villages, says "The country has become remarkably free from dacoity".

Public often ask me about the general attitude of Burma people towards Britain. The relationship has always been good even at the most violent periods of nationalist propaganda. The Burman was always ready to exempt from his general denunciations the Britishers with whom he had to deal. I think at heart he realised that

politics was a game, which he enjoyed as much as we British people do. Nationalist aspirations had to have some very subtle and powerful enemy, on whom all the contemporary misfortunes and obstacles could be placed. An elusive "British Imperialism" just fitted the case, and every political party seemed to think that its only hope of popular favour was to go further than its opponents in denunciations. Yet Britons and Burmans have always got on well together. The Burman is friendly and hospitable, you can meet him as an equal for he does not throw his weight about or cringe in servility, he has a sense of humour, he is courteous. Individually, Britons and Burmans have seldom failed to understand one another.

Since the war I have been amazed that Burma has remained so attached to Britain in sentiment. Communists were not slow to point out that the only two great powers in the post-war world were Russia and the U.S.A. Nobody else ever suggested that Burma should look to Russia for inspiration and help, nor was there ever the suggestion that a war-stricken Burma would do better to look to prosperous America than struggling Britain, in spite of most lavish American information services. Many Burmans are Socialist in their outlook and they realise that there are two types of Socialism in the world—the British type and the Russian type. And most of them want the British type. I won't say that that may be the reason why they are in such a hurry for nationalisation! But I would say that perhaps Britain's readiness to give Burma freedom may have had some influence in the Burmese generosity towards their own minority peoples.

I am sorry that Burma has gone out of the British Commonwealth just at a time when we were becoming a real Commonwealth. I don't believe that at heart Burma really wanted to go. Political propaganda had got to such a pitch and had developed such momentum that it was impossible to withdraw a demand which had been made so vociferously. If only a decision could have been deferred for another year, I think it might have been different. Also there was very little idea of the real meaning of Dominion status, a mistake for which we British must bear the blame. I would not be without hope that Burma might one day want to come back into the Commonwealth; if she does she will be all the more valuable because of her present experience. She is now responsible for her own future and welfare. She has a difficult task before her—reconstruction after the war, the establishment of law and order, the cultivation of strong public opinion, inculcating discipline and hard work, advancing the welfare of her rural population, organising universal education, developing her industries and trade, founding a new Buddhist state on Buddhist ideals, maintaining her rightful position in S.E. Asia.

What are the hopes of a truly democratic state? Ultimately, I believe, that they are good. For there are no caste or class distinctions among the peoples of Burma; there are no irreconcilable racial problems; under Buddhism Burmans have had kept before them ethical ideals, tolerance and generosity. In the social pattern of the past there was quite an amount of democratic practice in the leadership of headmen and village elders. Burmans in tackling any thorny problem like to reach an agreed solution; they are not such admirers of the majority vote as we are. There may be in this a fear of standing out against a majority, but there is also the possibility of a truly democratic method of reaching a common mind which shall be as fair as possible to all parties concerned. The ultimate chances of democracy are not

unhopeful, and that should give us some satisfaction. The British Burma era has not been an unfruitful or unhappy one; in years to come we may be able to see a harvest of which both British and Burmans can be proud.

Let me close by recounting a personal incident which crystallises the viewpoint of the modern educated Burman. In January, 1945, I went to Ceylon with a Burman member of the I.C.S. to talk to British forces which were then thought to be waiting for a seaborne invasion of Lower Burma. At one crowded meeting a British soldier got up and said "Why is it that you Burmans are always talking about independence and self-government? Do we ill-treat you? Aren't you satisfied with the government that we give you?" My colleague was on his feet in a moment. "You British people", he said, "come to our country, you take it over, you make us learn your language, you teach us your history which is full of your own struggles for freedom, you teach us your literature which enshrines just the same principles of freedom, and then you expect us not to want freedom! If we didn't, we should be bad pupils!"

The pupil has graduated: we hope "with honours".

DISCUSSION

Group-Capt. H. St. CLAIR SMALLWOOD: I heard with a good deal of sadness our lecturer express the view that the lot of the Karens was not a very happy one. I have had quite a lot to do with these people, some of whom served under my son behind the Japanese lines, and I have the greatest admiration for them.

I feel that the Karens have, in a way, been let down by Great Britain, and I should very much appreciate a word from the lecturer as to whether there is any chance of improved treatment being given to them by future governments of Burma.

The Rev. G. APPLETON: I should like to make one point clear. I meant to give the impression that the Karens were unhappy, and not so much that their lot was an unhappy one, inflicted, as it were, upon them by other people. I believe that as a result of the attitude shown by Aung San and carried on by his successor and colleagues, the Karens will have a square deal.

In some ways I believe that they are the finest people in Burma. They have a simple character and a strength of backbone which those of us who have known them admire. I think that they can make a real contribution to the national life, but at the moment they have put themselves on the wrong foot through not very wise leadership. I believe that the right step for them to take would be to accept the advances which the present Burmese Government is making to them, and say "We shall try and forget the past, and believing your good faith try to make a success of the united national life". That is what I try to say to my Karen friends, and I think that is what English people out there who are in contact with them have also said; but it is a very difficult psychological position, to which no one has quite found the right key.

I feel that the present Burmese Government is trying to soothe their feelings and to give them the assurance that they will have a fair deal in the life of the nation. It is their unhappiness and lack of decision which gives me misgiving rather than the fact that they are being ill-treated which, I think, at the moment, they are not.

THE CHAIRMAN: I think that anyone who has been to Burma has the greatest admiration—in fact, love—for the Karens; but I suppose that everyone who has had anything to do with the Karens has found the utmost difficulty in reaching agreement as to their future. The trouble is that the Karens are divided into two parts, the Karens in the hills, who are in the minority, and the Karens in the plains, who are inextricably mixed up with Burmans and who are in the majority. It was evident to us in the last

few months that the Karens in the hills did not care what happened to the Karens in the plains and *vice versa*. The Burmese are prepared to give the Karens a Karen State which comprises Karenni and other parts of the hill area in Burma. That is acceptable to the Karens in the hills, but it is not acceptable to the Karens in the plains, who have been asking for something larger. They have been asking for a Karen State which includes a piece of Burma with either a majority of Burmans or Mons. It is a problem which I do not think is insoluble but is one which will prove of great difficulty to both Burman and Karen.

The present leader of the Karens of the plains is a friend of mine, Saw Ba U Gyi, and at my last party at Government House I was able to get both leaders (Burman and Karen) together and they promised me that they would have further conversations to see whether it was possible to come to some agreement as to the future of the Karens in the plains. The Karens in the hills, who were with us in fighting the Japanese, have been offered Karen State and are prepared to accept it, but it is the Karens in the plains for whom we have to find a solution. The way in which the Prime Minister, Thakin Nu, is going about it now may possibly achieve success, and I sincerely hope it will, because it will be a very happy day for me if success is achieved.

SIR WILLIAM BARTON, K.C.I.E., C.S.I.: I should like to know what is the position of Indians in Burma. I believe there are a million of them in Burma, and I wonder whether the lecturer would care to say a word as to their future.

THE CHAIRMAN: Just before Burma received its independence there was a great fear amongst the Indians that they would be maltreated, and there was a great urge amongst large numbers of them to return to India. The Burmese Government were at great pains to point out to them, however, that on no account would they be treated differently to other citizens. All they wanted to assure themselves from the Burmese point of view was that those Indians who lived in Burma intended to make Burma their country of adoption and were not there solely to amass money and then to return to India.

I think that one of the things which the Burman has always disliked was the Indian coming into Burma from India, making his money, and then returning to India having made sufficient to buy a small farm or whatever it was he desired in India. Providing the Indian was prepared to make his home in Burma, the Burman, who has no race consciousness, was prepared to accept him. Since leaving, the information I have received is that the Indians left behind have regained their confidence to a far greater degree than I thought possible, and with the Indian's aptitude for work, I see no reason why his future in Burma should not be as happy as it was in the past. Probably the questioner will remember that in the past there has been anti-Indian trouble, and that may occur again; but I see no reason why it should be any worse in the future than it has been in the past.

The Rev. G. APPLETON: Perhaps I might add a word about the pre-war situation. I think the difficulty in the minds of the Burmese was this. There were a million Indians in Burma, most of whom were looking to India and sending their money there. They claimed all the privileges of citizenship in Burma and, at the same time, wanted to retain their citizenship in India. I think it was that double claim of citizenship that disturbed the mind of the Burman who was aware of it.

With the Japanese invasion, some 400,000 Indians went back to India. The 600,000 who stayed behind naturally became more and more tied to their Burmese habitat, and they were in most cases Indians who were making Burma their home. A lot who went to India found that they were not nearly so welcome as refugees without any money who return to live with their relatives as they had been in the past when they went back to India for holidays with plenty of money in their pockets, and a large number of them felt that India was no longer their home, so they wanted to get back to Burma.

Sir HENRY CRAW, K.B.E., C.I.E.: I have two questions that I should like to ask. The

first is in connection with the Indian chettiers. I think that one of the most difficult problems concerning the relationship between the Indian and the Burman prior to the Japanese invasion was the question of land. Large quantities of most valuable land in Lower Burma were held by the Indian chettiers, and I should like to know whether that position is going to be settled by some form of redemption of the land, or is the Indian chettier coming back as the landowner?

The second question is not dissimilar and concerns the Chinese. The Chinese lay claim to practically one-third of the north of Burma, and I should like to know whether that claim is being pressed, and also how the old Chinese residents are being dealt with.

THE CHAIRMAN: Regarding the Indian chettiers, it is perfectly true that some 60 per cent. of the arable land in Southern Burma was in their hands at the time of the Japanese invasion. A large amount of this happened at the time of the great slump when the chettiers, who had advanced money, had to foreclose on various mortgages. The Burmese are now adamant that they will not have that system back again. They have stated in their constitution that they are going to pay compensation, but what compensation they will give to these chettiers, I do not know.

At the time I left the chettiers had not returned in any great numbers. You may remember that about eighteen months ago a leading chettier did arrive in Rangoon, and he was assassinated, not by a Burman, but by an Indian. Since that day there has not apparently been great anxiety on the part of chettiers in India to return to Burma!

That question of ownership of the arable land is one which the Burmese Government will have to settle. All I can say is that Thakin Nu's final remark to me was to the effect that compensation was in the constitution, and that they would pay it; but they will not allow the chettiers to regain their great control over the arable land which must be in the hands of the peasants.

The Rev. G. APPLETON: The claim of China to any part of Burma is not at the moment an open one, but I have seen Chinese maps in which certain parts from the border down almost to Mandalay were marked as areas which were regarded as parts of Greater China, as it were, which they wanted to get back. In January, 1946, before our Chairman came out as Governor of Burma, there was the incursion of a Chinese battalion over the border into Burma. It got as far as the Irrawaddy and was then halted by the British officer who happened to be the Deputy Commissioner of the area. It took some weeks before those troops could be persuaded to go back. Diplomatic action was taken with the Chinese Government, but I think the thing which finally convinced the battalion commander of the wisdom of going back was the threat that if they were not out by a certain date they would be bombed out by the Royal Air Force. That incident was not made public. I think it would have been a wise thing for everybody concerned if it had been, because it would have indicated some of the things which can happen under certain circumstances.

I think there is a difference between the Chinese as individuals and the attitude of the Greater China enthusiast. The Chinaman does seem to settle down in Burma, not exactly as a Burman, but very much in the Burmese atmosphere, and he is not looked upon nearly as much as a foreigner as the Indian or Briton, so there is not the same difficulty. There were 200,000 Chinese in Burma before the war, but I do not think anything like that number have returned, although they are coming back fairly rapidly.

The Burmese and the Chinese are of Mongolian stock and they understand each other pretty well. Very often the Chinaman takes a Burmese or Karen wife and the resulting family produces men of character who take up government service or a profession.

Brig. J. F. BOWERMAN: I had a fair amount to do with the Chinese army in Burma, and particularly with the administration set up by the Chinese at the end of the war. Six weeks ago I was told on fairly good authority that the Chinese had claimed some 62,000 square miles of Burmese territory. I asked at the Chinese Ministry of Information about five weeks ago whether that was correct or not, and although I did not get a

definite answer as to whether it was or was not correct, I was told that there was a Sino-Burmese Commission sitting on the frontier discussing this question of the Chinese claim.

THE CHAIRMAN: Brigadier Bowerman is correct in saying that a statement was made publicly, but it was not made by the Chinese Government. It was made by a Chinese professor who stated that some 70,000 odd square miles of Northern Burma did in fact belong to China. That statement was made some time in December. Ever since then the Chinese Government have been at their wits end to try and disabuse that statement made by one of their professors. When the Chinese representative arrived for the independence celebrations on January 4th, he came to see me, and I raised that matter with him. He was quick to point out that the professor who made that statement had no authority, and that it was completely unfounded. However, be that as it may, the subject is not a closed one as far as the Chinese are concerned.

The Commission on the frontier is news to me, and I do not think that there is one. The Chinese are always talking about one, but whenever we recommended one in the past, they failed to put in an appearance, and that may go on for some time yet.

I think that you will agree with me that we have had a most interesting and instructive lecture by the Reverend George Appleton. You will have noticed that Burma has recently been receiving a certain amount of prominence in the Press. In the last few days the *Times* and *Daily Telegraph* have been writing it up, and I do think that it will be of great interest to all of us here, especially those of us who have had many contacts, to see what in fact happens over the next few months in Burma. It will be a tussle between the Government and the Communists led by Than Tun. He is a man for whom I have a great admiration as regards his ability, but he is up against the Government. I saw in the Press a few days ago that orders had been sent out for his arrest, but whether he has evaded it or not I do not know. It will be a question in the next few months of the Government against the Communists. I think the Government will win, and then we shall see what the future of Burma will be.

I should like you to join with me in thanking the Reverend George Appleton for his lecture which we have all enjoyed.

The vote of thanks was carried with acclamation, and, after a vote of thanks had been accorded the Chairman, the meeting then terminated.

OBITUARY

FRANK CHARLES MEDWORTH.—We regret to announce the death of Mr. F. C. Medworth who had recently been elected a Fellow of the Society. Medworth had lived in Australia for the last nine years and gave much help in raising the standards of Art Education there. He was a member of many of the contemporary art societies and had works in, among other places, the Victoria and Albert, and British Museums. He was in charge of the Technical Branch of the Art Department of the New South Wales Department of Education.

NOTES ON BOOKS

THE ATOM AND ITS ENERGY. E. N. da C. Andrade, D.Sc., Ph.D., F.R.S., F.R.S.A.: G. Bell and Sons. 1948. 10s.

It is a pleasure these days for a reviewer to relax and enjoy a non-controversial book on an intricate subject, written in clear English, with a style of distinction, yet exhibiting an urgency that compels the reader to grasp the information thus presented. Professor Andrade is fortunate in that he is of a generation which could know intimately the great men concerned with nuclear physics, Rutherford in particular, and can thus correlate their work with knowledge of the way they thought, apart from what they said. The field in which they worked is extremely difficult, frequently dealing with single particles moving at speeds impossible to appreciate in terms of ordinary existence. But they bent mathematics to the phenomena they observed; they continued over a comparatively long

period to discover the particles comprising matter which we now know, and their work, we must admit, on the strength of mathematical calculations and without experiment, culminated in the prediction that a bomb utilising atomic energy was possible. This fundamental idea was published to the world just before the recent war, and, thereafter it was a race to get and use that which was to finish the war.

The author sympathetically deals with the struggles, doubts, and achievements of these pioneers, and shows how their contributions add up to the knowledge now available which, we trust, can be diverted into useful applications for mankind. No one will gainsay the application of any technique to biological and medical science and the dangers are known and can be increasingly guarded against. Applications aimed at the production of industrial power are likely to be protracted, both on the score of availability of sufficient fissile material and the knowledge that there is not a great economic case for changing over from coal, except the conservation of the latter, which must be considered in the name of national, or even international, economy.

The military situation is still not clear, and here we are referred to the proposals for control of the manufacture and the use of fissile materials, made to a commission set up by the United Nations. The possibilities of inspection are discussed and the difficulties stated, but the author is reticent on the methods of using atomic bombs and other competing weapons of destruction. This is, of course, anyone's field of speculation, but the author is probably right in withholding discussion at the present time, since it is highly probable that the general reader will never be able to do anything by himself in the event of an atomic catastrophe. The experts are agreed on one thing only, that there is no foreseeable line of defence against atomic weapons, although much can be done along Civil Defence lines to minimise suffering. The best that we can individually do towards salving our consciences is to work to the utmost for international understanding. The present text will give the background information required for an effective start in this direction.

L. E. C. HUGHES.



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the fable of the man-at-arms

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4772

FRIDAY, JULY 2, 1948

VOL. xcvi

MEETING OF COUNCIL

A meeting of Council was held on Monday, 14th June, 1948. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Sir Alexander Aikman; Mr. F. H. Andrews; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Edward Crowe; Sir Thomas Dunlop; Dame Caroline Haslett; Sir Henry McMahon; Mr. F. A. Mercer; Mr. J. A. Milne; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Sir Frank Smith; Mr. J. G. Wilson; Mr. William Will and Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Abell, Rev. Thomas, Leigh, Lancs.
Armitage, Hugh Traill, C.M.G., Sydney, Australia.
Astbury, Norman Frederick, M.A., Wolverhampton, Staffs.
Attlee, Robert B., M.A., London.
Barker, George, PH.D., M.Sc., Helensburgh, Dumbartonshire.
Barran, Edward Nicholson, London.
Boller, William Henry, Birmingham.
Boulter, Captain Lewis Aubrey, South Croydon, Surrey.
Breeze, William Lawton, Ewell, Surrey.
Bridgewater, Ronald Aubrey, Barrow-in-Furness, Lancs.
Buckland, Philip Harry Beale, London.
Butcher, Eric William Victor, Purley, Surrey.
Cake, Godfrey Hugh Freeman, Henley-on-Thames, Oxon.
Clarke, Latham, A.M., PH.D., Montevideo, Uruguay.
Cox, Shaun Maturin, B.A., Westoe Village, Co. Durham.
Curtis, Henry Wilson, B. & L., Bradford, Yorks.
Dreyfuss, Henry, New York, U.S.A.
Duffield, Kenneth, London.
Edge, Stephen Rathbone Holden, M.A., Cambridge.
Erskine, Rt. Hon. Lord, G.C.S.I., G.C.I.E., Alloa, Scotland.
Fairclough, Wilfred, Kingston-on-Thames, Surrey.
Flack, George Ellis, M.A., Nottingham.
Foxell, Rev. Maurice Frederic, M.V.O., M.A., West Horsley, Surrey.
Framjee, Dhun, New Delhi, India.
Frape, Albert, Salford, Lancs.

Glass, Harold Marks, M.Sc., PH.D., Worksop, Notts.
 Gordon, Donald Frederick, B.MET., Dore, nr. Sheffield.
 Hackett, George Abbott, Woodhouse Eaves, Leics.
 Hadwin, Richard Norman, B.A., London.
 Hale, Frank Corbyn, B.Sc., Farnborough Park, Kent.
 Hall, John Kendell Howard, London.
 Hiler, Hilaire, Los Angeles, U.S.A.
 Holliday, Thomas Stanley, Carshalton, Surrey.
 Holman, Walter Ernest, London.
 Kay, Rupert Michael, B.Sc., Manchester.
 Kilby, William, B.Sc., Bolton-le-Sands, Lanes.
 Lancaster, Edward Purser, Bognor Regis, Sussex.
 Lock, Anton Albert Henry, London.
 Luxmoore, John Maarten, Altrincham, Cheshire.
 Malmquist, Prof. Karl Gunnar, D.PHIL., Uppsala, Sweden.
 Martinez, Rodolfo, Cordoba, Argentina.
 Marx, Miss Enid Crystal Dorothy, R.D.I., London.
 Matthews, Sydney Kent, New Malden, Surrey.
 Newton, Flt.-Lieut. Jack Lamport, London.
 Noble, Sir Humphrey Brunel, BT., M.B.E., M.C., Hexham, Northumberland.
 Norman, John Henry, R.O.I., Coventry.
 Norway, Nevil Shute, B.A., Hayling Island, Hants.
 Oakley, Dereke Percy, Sutton Coldfield, Warwicks.
 Pearson, Robert Stanley, Co. Durham.
 Pelletier, Prof. Robert, Montreal, Canada.
 Perkins, Roy Frederick, Walsall, Staffs.
 Roberts, Arthur Wynne, B.COMM., Barbados, B.W.I.
 Rule, Tom Edgar, Leicester.
 Seale, Miss Zana, London.
 Shaw, William Simpson, D.Sc., PH.D., Helmshore, Lanes.
 Standring, Percival Kay, B.Sc., Heywood, Lanes.
 Stanier, Harold, M.A., Westcliff-on-Sea, Sussex.
 Thomas, Richard, D.Sc., Bromborough, Cheshire.
 Walshe, James Terence Joseph Patrick, London.
 Wilkinson, Bernard, Camberley, Surrey.
 Williams, Howell, Harrow, Middlesex.
 Wilson, Harold Frederic, B.Sc., Sidcup, Kent.
 Windebank, Charles Stanley, M.S., Abingdon, Berks.

The following were duly elected Associates of the Society:

Palmer, Roy Mervin, St. Albans, Herts.
 McDowall, Michael John, London.

Mr. F. H. Andrews, O.B.E., was elected an Honorary Life Fellow under Bye-Law 53.

One appointment was made to the distinction of Royal Designer for Industry, viz., Mr. Christian Barman (see page 427).

Possible changes in the hours of the Society's meetings were considered.

The draft Report of the Council for 1947-48 for submission to the Annual General Meeting was considered, amended and approved.

A quantity of formal and financial business was also transacted.



Courtesy of the Crown Film Unit

Her Royal Highness The Princess Elizabeth speaking on May 31st in the Society's Lecture Hall at the first meeting of the Council for the Festival of Britain 1951. On her right is Mr. Herbert Morrison and on her left Lord Ismay

THOMAS GRAY MEMORIAL TRUST

The annual examination for prizes for the Junior Nautical Courses and Cadet Courses was held on June 9th. Only three schools entered candidates, 23 of whom sat the examination:

Leith Nautical School	...	...	...	...	...	7
Royal Technical College, Glasgow	...	...	...	...	...	12
Sir John Cass Technical Institute, London	...	...	...	...	...	4

The examiner has reported that the standard of the examination was somewhat disappointing. The Prize of £5 for the highest marks in the paper on Mathematics, Navigation and Nautical Astronomy was won by Ronald Scott Brown of the Royal Technical College, Glasgow, that for the highest marks in the paper on Science and General Knowledge by Alan Douglas Wake of the Sir John Cass Technical Institute and for the highest aggregate marks in both papers by Kenneth James Leslie, also of the Sir John Cass Technical Institute.

CRAFTSMANSHIP

(VI) CODES OF WORK IN GLASS HISTORY

By W. A. THORPE

Sixteenth Ordinary Meeting, Wednesday, April 7th, 1948

Colonel E. E. B. MACKINTOSH, D.S.O., late Director of the Science Museum, *in the Chair*

THE CHAIRMAN: In this series of lectures on craftsmanship, glass is our subject to-day, and in my humble opinion a very proper and important one; because even in these rather impersonal days of the machine and repetition work very much of glass manufacture depends entirely on the skilled craftsman. I can remember that because when I was taken round a rather well-known glass works at Harrow, Wealdstone, I saw the men there turning out the most lovely things with the crudest tools and no measuring instruments at all. I asked the kind Director who took me round how they managed to do it, and his answer was always the same "Oh, they know". There is the whole story. Every man was a skilled craftsman and that was how he produced such beauty.

This afternoon Mr. Thorpe is here to tell us of the Codes of Work in the history of glass. As I think most of you probably know, Mr. Thorpe was for very many years responsible for the glass section of the Victoria and Albert Museum, so he needs no elaborate "Who's Who" from me. But I can bear witness to the very wide and profound knowledge he thereby gained of this fascinating subject, and I know from experience that he can treat of it with equal felicity whether on the æsthetic or technical side, or again, from the historical and sociological aspect. I think that, if he takes us for a world tour in his talk this afternoon (I do not know what he is going to say), we could not want a better courier.

I want to mention one lesser known activity of his. In his spare time he is President of a small society called the Circle of Glass Collectors, of which I am a humble member myself. At our monthly meetings I have had the frequent good fortune to hear him discourse on many varied facets of glass and succeed in making them all sound equally brilliant and attractive. On each occasion I realised fully what a great reserve of knowledge he still had to draw upon if time had only permitted. I always wanted to hear more, so I will now ask Mr. Thorpe to read his paper.

The following paper was then read:

I. COUNTRIES AND CODES

The political classification of Robert Schmidt and his disciples has had unhappy effects on the study of glass-history. It is constantly breaking down, never more than in the seventeenth century. It is impossible, in familiar kinds of glass, to say: England or Netherlands, Netherlands or South Germany, Rhine or Scandinavia, Venice abroad or Venice at home, France or Spain. The "art and mystery" has long been an international one.

The craftsman, as is well known, has been inclined never to invent if he can copy, or to change if he can go on in the same way. Habits served some purposes of machinery. In time-lag and overlap glassmakers have had much in common with other kinds of craftsmen. They have been also a race apart. In the first century A.D. Ennion and other recorded makers of mould-blown glasses, apparently working in many countries, called themselves Sidonian. It was almost a title in glassmaking, like sixteenth-century claims to make "Venice glasses" or to come "*de Venise*". The tombstone of Julius Alexander, Carthaginian master-glassmaker, was found at Lyons and speaks at length of sons and grandsons, some of whom are likely to have carried on his trade. In the fourth century glassmakers are recorded in the

Roman provinces as *per singulas civitates morantes*. Provision was made for them to train their own sons (*suos filios erudire*); from which it is no far cry to the *puer* of Evagrius and Theophilus and to the "boys" of flint. The prosopographical researches of Beaupré (1846), August-Matifeux (1861), Houdoy (1873), Le Vaillant (1873), Pinchart (1882-3), Schuermans (1883-), Bordoni (1884), Boutillier (1885), Grazebrook (1877), Pholien (1900), Hudig (1922), Halahan (1925), and many more, illustrate again and again the hereditary, migrant, temperamental quality of the glass *noblesse*. Only second to this is the pursuit of fuel and materials which has delineated the glass map of Europe. The names of the nine French-Altarist families, those of the glass nobility at Venice, and in Poitou, Lorraine, Normandy, Nevers and Antwerp, occur over a wide field. Verzelini had worked in Venice, his home, before he came to Antwerp, and thence to London.

In glass history, Dr. Schmidt and his followers tend to put (game) before code,

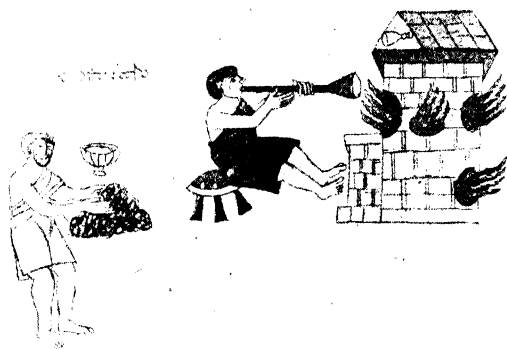


FIG. 1.—Furnace for general purposes including annealing in Italy about 1000 A.D. (From an illustration inscribed *x de vitro to an illuminated manuscript, written about 1023 A.D. and long preserved at Monte Cassino, of the huge work of Hrabanus Maurus (776-856), Archbishop of Mainz, De Universo lib xvii, cap x de vitro.*) The miniaturist thinks of the blowing as through a kind of trumpet. On the left is the preparation of clay for glass-pots (?)

i.e., not to allow enough for professionalism in glass. The classification by code now suggested would put industrial circumstance before political frontiers.

II. THE FOUR JUNIOR CODES

1. The Forest Code

Forest-glass, *Waldglas* in German, *verre de fougère* in French, is the deep green metal of Northern glassmaking. It was founded with forest timber and fused with vegetable alkali, often fern. As expression it is characteristic of the Germanic countries, as are inflation and its descendants of the Latin civilisation. Inventories and examples attest its vogue in Holland and Denmark, Sweden and Norway. It stretched across Belgium and far into France. In England, where Latinity and Teutonism have kept uneasy peace, the code of Lorraine was at war with Normandy in the Weald. Later movements have contributed the beautiful bottle-house ware

called "Nailsea", and the lay-out of the modern industry, not least the bottles of the bottle-machine.

But forest-glass is above all a German thing. It is the most habitual of the codes. The natural green was conserved and encouraged for centuries, and attained a dark luminous quality not found in other green glass, as Spanish comparisons will show. It has the great merit in metal of looking soft when it is hard. No other code also has produced a specific set of shapes. These are decorated in the glassiest fashion with great sobbs of the metal, and have a mystical uncouthness and often great power.

Excavations of mediæval glass works at Corinth, which have been admirably published by Miss Davidson, a recent discovery of considerable importance for glass history, suggest that in origin some of these forms and devices were Near Eastern. But the *Rüsselbecher*—what we call in England claw-beakers—and their successors some centuries later, *Krautstrunk*, *Krug*, *Roemer*, *Humpen*, *Spechter*, *Passgläser*, *Stangengläser*, *Igel*, *Scheuer*, *Phallusgläser*, *Angster-Kuttrolf*—these are a German appropriation. The softness of this metal for the muffle-kiln sustained the third merit of the Germans in glass. The enamelled decoration of the sixteenth and seventeenth centuries consists of Old Testament illustrations, piety, princely portraits, processions of local tradesmen, Latin aspiration, whole squadrons of heraldry, and (as Dryden says):

". . . three holy mitred Hectors
And the whole college of Electors".

These things are presented in a brilliance of primary colours without parallel in Western glass vessels. The seventy odd pages of Dr. Schmidt's account (pp. 133-124) are much concerned with identifications of particular *Kellerei* glasses. For a more sympathetic study of forest as the German spirit in glass we had to wait until the National Socialist movement, and the understanding and able work of Dr. Franz Rademacher. Here is *altdeutsch* up to date.

2. *Cristallo*

Forest-glass remains a Gothic art, though most of its expressions, as we now know them, succeeded the Middle Ages. *Cristallo* was the code of the Renaissance. As a metal it was capable of great brilliance and smoothness, and it took colour well. Better than any of the classic metals it embodied the essential qualities of crystal glass, ductility and clarity, softness and fluency. Where flint, the chief of its rivals, may claim to have no equal as a material, *cristallo* is easily first as a medium. It blew and worked very thin, and it was a quick cooler, needing constant warming-in, a nice sense of working heat, speed and dexterity in manipulation. It thus had the sovereign merit of a medium, that of eliciting talent from its performer. With annealing brought to high perfection, its disembodied forms and beauty of detail were admirably suited to the swift and sensitive relish of Renaissance Italy.

Work in this metal was understood by a French traveller, one of the many sixteenth century sightseers who visited Murano. André Thevet was at Venice in or soon after 1584, and wrote in his *Grande Insulaire*:

"Ils manient ceste matière fragile si gentiment ou'ils en disposent mille gentillesses ainsy qu'il leur vient en fantaisie. De mon temps me fut montré un ouvrier si

gaillard en son art que de petites fleustes d'orgues qui avoient quelques sons harmonieux et faisoit semblablement des petits chasteaux, tourracelles et tournois tout autour et n'y avoit aucun qui ne fut ravy de voir telle gaillardise comme aussi les navires et galeres qu'il contrefaisoit au naturel sans que rien y manquist".

In French as in English *galliard* and *gaillard* connoted, said Sir Thomas Elyot in 1533, "violent exercise and swift when they are joined together at one time, as dansyng of galyardes". The *gaillard* dance was long famous for its agile movements. In Thevet's time, *gaillard* was becoming a "vogue" word in the new philo-



FIG. 2.—The Agricoline Fritting-Furnace (*prima fornax = schmelzofen*)

After the *De Re Metallica Libri xii* (1550), Basle, 1561, *Lib. xii*, p. 471, of Georg Bauer (b. 1490, d. 1555), called Agricola, the "father of mineralogy", Rector Extraordinarius of Greek at the School of Zwickau, and later physician in the Joachimstal, Bohemia. Based on studies in Italy (about 1525), including a visit to glass works at Murano.

sophy of the "cosmic dance", as Professor Tillyard calls it. John Davies in *Orchestra*, his poem on the dance, and one of the first philosophical poems in English (1594) sufficiently explains its associations:

"For that brave Sun, the father of the Day,
Doth love this Earth, the mother of the night
And, like a reveller in rich array,
Doth dance his galliard in his leman's sight,
Both back and forth and sideways passing light.
His gallant grace doth so the gods amaze
That all stand still and at his beauty gaze".

In "Venice glasses", and to some extent in all fine glassmaking, we are concerned with something like the vanished gestures of an actor or sleight of hand in the crew of a music-hall turn. If Thevet is to be corrected by modern analogy, it is by the ballet.

In form the invention which made Venice, and all later glassmaking, was the three-piece wine. This was the conception of a drinking-glass as a rising, stemmed, thing fashioned in three parts (bowl, stem and foot), which were then joined, often with merese finish. This was a new thing. Stemmed form in antiquity is inessential and rare. At first the new metal, weighted by the mediæval prestige of silver gilt, ran to massive standing bowls and the other metal forms so woefully esteemed by art-history. Little else is ascribed to early date. At Venice glass became glassy about the middle of the sixteenth century. The naturalism of "root" and "stem" and "flower" in wine-glasses, may have been the result of the vogue of printed and illustrated herbals, and particularly of the coming of the tulip into European horticulture. In 1554, as Sir Daniel Hall has lately pointed out, Busbek, the Emperor's Ambassador to Turkey, wrote of a journey to Constantinople through Adrianople. There, "*ingens ubique florum copia offerebatur narcissorum hyacinthorum et eorum quos Turcæ tulipam vocant*". The tulip is perhaps the flower which most accords with the "diaphanous pellucid dainty things" of James Howell's description. This organic sense of form finally released glass from silver, and has defined, since the sixteenth century, what a wine-glass *is*. It has dominated production in many other than drinking-vessels.

The Venice code did a third thing that had not been done before. It combined cane with inflation, in fact it *blew cane*. The foundation of milk twist, as *laticinio* may be translated, was crystal cane drawn round milk threads spirally twisted. Varieties of milk cane were, as is well known, set vertically in a desired alternation round the inner walls of a cylindrical mould, and was then picked up on the paraison and incorporated to taste. The bowls of the resulting drinking-glasses look like a row of palings painted white. Sometimes the pattern was feathered by combing and twisting the paraison. Sometimes the milk twists were laid on a *cristallo* surface and stand out in relief. When they retained their form thus the Italians called the vessels *vasi a ritorti*. Milk cane was also the source of the net glasses (*vasi a reticelli*), perhaps the finest combination in glass-history of decorative effect with manipulative dexterity. The envelope method is a fascinating one. Paraison A was first blown, and having picked up milk-cane to taste was twisted to give a spiral movement in one sense. Paraison B, similarly treated, yielded a spiral in the opposite sense. Paraison A was then sheared sectionally and paraison B enclosed within it so that the two senses crossed. The third paraison was then blown and marvered, and by twisting and trundling made into most of the shapes of baroque glassmaking. The effect is finely seen in the white whorls of twenty-inch dishes. In such lace-glass, ornament, unlike much ceramic ornament, is germane to the form, being embodied in the form.

3. *The Interchanges of Baroque.*

"Venice glasses", perhaps even glasses of "Venice making", were terms of art in the trade. They implied a type of fabric and a code of work rather than a place

of manufacture. In this country they often mean made at Antwerp, the Venice of the North, and in 1601 the "pack horse of Europe", or made in Flanders generally. Conversely the forest code is indicated in inventories and lading lists by "beer-glasses", and by such terms as *ordinary glass*, *common glass* or *Flanders making coarse*, and *Flanders making fine*. This distinction is well seen in Scottish import rates for 1612 and 1689:

1612			
Glasses called hour glasses	of Flanders making coarse the groce	xii	li
	of Flanders making Fyne the dozen	iiii	li
	of Venice making the dozen	xii	li
Glasses called drinking glasses	Venice glasses the dozen	vi	li
	for drinking of beer the dozen	xx	s
	for drinking of wyne the dozen of common sort	xx	s
	Cowp glasses for drinking of wyne the dozen	xl	s
1689			
Drinking glasses vocat.	Venice drinking glasses the doz.	18	o
	Flanders drinking glasses the hundred glasses	1	5 o
	Scotch and French drinking glasses the C cont 5 score	15	o

Long preserved isolation at Venice and at l'Altare had by that time broken down. Italians were working in France, the Netherlands, Germany and England. Germans and Czechs are to be found in the Netherlands and in this country, Frenchmen and Low Countrymen in Spain. Members of the Normandy and Lorraine *noblesse* were all over the North of Europe. The Altarists were everywhere—as far North as Kiel we find *Rüsselsche nach Art der Altaristen*—some kind of *Nuppen* glass. We need go no further than Marsell's lists for *cristallo* and forest-glass produced under the same management.

The tendency was for the codes to be distinct, the *cristallo* men working at one furnace and the forest men at another. There are abundant instances of their influence on one another. Teutonic forms, especially *Humpen* even *Römer*, occur throughout the seventeenth century in forest that aspires to be white; and near-white forest may be found, especially locally, in Italian three-piece forms. Between three-piece design and the Teutonic forms occur a fascinating series with the qualities of both. The flute (Germ. *Tulpen*) is perhaps the best example of the Gothic will-to-height in three-piece Latin terms, and it is normally found in net glass and in some sort of *façon*, and was of course transformed into flint champagnes. The flat coiled façades of the *Flügelgläser* belong to people intent rather on Italian fashion than true to turnery. In Germany the tall bulb-and-merese goblets called Nuremberg are a conspicuous instance of forest gone white and of the Gothic will-to-height translated from *Stangenglas* and *Spechter* into a stemmed half-Latin form. Conversely the pole forms occur in milk twist or in twists of milk and coloured *cristallo*, even in lace-glass; and *Römer* and *Krug*, and indeed most of the Teutonic forms, are found in white *cristallo*. Bright enamelled heraldry and pious or pompous subjects of many kinds are painted on forest that has almost lost its *altdeutsch* devotion to deep green. Instances of "crossed codes" might be multiplied. They will support those who

contend that the baroque taste was an approximation of Teutonism and Latinity. After 1700, forest, except in bottle-houses, had nothing new to say.

4. *The Crystal Revolution*

Historians of glass might contend that these brilliant anomalies—the clarification of forest, the coarsening of *cristallo*, the coming of the chandelier, the optical fantasy of mirror-plate—were a new idea of glass: glass as light made material. They were succeeded by the certainty and solidity of crystal. Flint, which had followed in the wake of the new Royal Society (1662), lead the way for Europe. It was the first lead-crystal. It was, that is, the first glass to pick up the lead which had so long been the preserve of the soft gem-pastes, and to apply it to the fusion of crystal, for which alkalis mainly had previously been employed. The fathers of this change, Christopher Merret and Robert Boyle, and perhaps the strange genius of Hooke (who had a part in so much) were intent on high quality optical ware. Ravenscroft was no more than their translator into the domestic trade. The true inventors were the producers, the Worshipful Company of Glass Sellers. The merits of the metal were not only in the perfections which they sought, but the exaggerations that they acquiesced in.

Purists will maintain that furnace glassmaking surpasses any other glass process, and that its material, fashioned hot and soft, ought still to look soft when cold. Flint as metal and fabric, from its brief and brilliant baroque to its Irish surfaces, shares softness only with forest and with *cristallo*. It was now treated no longer as the oldest and most beautiful of *Ersatz* materials, but as a substance in its own right.

This extraordinary invention may be compared in importance with the coming of inflation before the first century B.C. and with Venetian developments in the fifteenth century. It changed European glassmaking. In the course of the eighteenth century France (especially Rouen), the Low Countries (especially Liège), Spain (especially La Granja de San Ildefonso), began to produce, with or without lead, glass which aspired to the look and qualities of flint. Even at Venice the firm of Briati about 1740 “went” crystal, when their neighbours were still going on with baroque glassmanship.

One country lagged behind. From the cage-cups of Roman Germany to the *Hedwigsgläser* exported from Cairo, and from these to German jewellers in the time of Caspar Lehmann, German “inferiority” has fastened on the idea of glass as an imitation of nobler stones. Nature, and the Middle Ages, dealt more softly with ruby than ever did Johann Kunckel. White glass in the eighteenth century was conceived by *Hochschnitt* and *Tiefschnitt* in the spirit of the *diatrëtarü*; but its forms are commonly gross and its minute skill often out of scale with them. Glass glyptic in Germany clung to pattern books of the *Laub-und-Bandelwerk* kind; we ourselves flirted with shop-cutting for thirty years before the West Midlands made it clear that glass is cut at a bench, not in a drawing-office.

Flint has had to pay for this æsthetic supremacy. It has never been primarily a blown glass. At the beginning of the eighteenth century it subscribed for a while to architecture, a structural not a plastic art. When the English punty came into its own it found antecedents in the turnery forms of several English trades, especially Restoration chair-legs and treen. “Knoppification” has no real parallel in other metals. Tastes formed on *cristallo*, like those of Bosc d’Antic in 1760, found

it *beaucoup trop lourde*. Its works may often lack grace and subtlety, but in an evolutionary sense soft crystal has captured Europe from hard. It enjoyed only 150 years of undisturbed craftsmanship; but it "carried" into industry.

III. THE TWO SENIOR CODES

1. *The Cane Code*

In Egypt from early dynastic times coloured glass pastes were worked at or below fusion by moulding and pressing processes for a variety of small architectural and ornamental articles, and for beads of brilliant colour and great diversity of form and pattern. Extensive remains of the Royal Glass Works of the eighteenth dynasty

Secundæ fornacis arcus A. Eius cameræ inferioris os B. Fenestræ superioris camera C. Ollæ ventrosæ D. Tertie fornacis os E. Receptacula vasorum F. Foramina superioris camera G. Vasa oblonga H.



FIG. 3.—*The Agricoline working furnace illustrating structure only. Secunda fornax=Glassofen; tertia fornax=Kuhlofen (Lehr).* (From *De Re Metallica Libri xii*, p. 473.)

were found by Flinders Petrie at Tel-el-Amarna. The vessels and fragments, and the sand-core glass of later date found elsewhere, and analogies with much later lamp-wrought pastes, suggest what were the main methods of fabrication.

It is likely that heat was obtained as in the metal industries, especially bronze, in which the Egyptians were proficient, by brazier firing or some similar open fire, akin to the blacksmith's forge. This meant that glass had to be worked at the relatively low temperature so obtained, often below fusion. For solid objects this was no great handicap. Glass, plastic below fusion, could be moulded or pressed, if it were warmed-in often enough. The difficulty was the production of hollow ware by such limited treatment.

Small containers of toilet goods, a few inches high, were nevertheless made of

horizontal striped canes of different pastes, often combed into zig-zag patterns. A stock of monochrome canes (especially cobalt-blue, opaque-white, red and yellow) was first prepared from frit. A fugitive core of mud or moist sand, of a long lentil shape, was then moulded round the end of a thin circular metal rod, probably of bronze, the father of the punty. This has left traces of its circular presence inside the necks of containers. The character of glass turnery is already evident. The core, being set, was kept in rotation by movement to and fro of the punty on the marver. The marver was used like an anvil. Monochrome cane A was then fed slowly on to the core and picked up by its rotation. Monochrome B followed, and then C, or A again, according to the pattern of alternation proposed. When the whole skin had been picked up, it was consolidated and evened by marvering. Any zig-zag pattern, probably done by a wood comb or spike, was done at this stage, between frequent bouts of marvering and warming-in. When this action was complete, foot-rims could be trailed on and tool-modelled, rotation being maintained and varied as necessary. To finish the orifice, the punty was withdrawn and the core put to flight; the vessel was then ready to be reversed, the neck could be finished, and the handles applied by a trail. Warming-in, at the brazier, must have been constantly repeated. The sleight of hand in this kind of work was not less than in the most delicate blowing.

Carrot and lentil shapes and the like, though not confined in Egypt to glass vessels, were natural "marver shapes". The highest quality of work is nevertheless to be found in bulbous forms of Amarnine date, which could not be marvered *level* and were to some extent a defiance of process. The colour and finish of some of this work is extraordinarily good.

Some further disturbance of technical habit was effected by export for the Greek markets, from the sixth century B.C. Greek fashion tended to conceive vessel form in terms of thrown pottery, in terms (that is) of ascendant forms bulging at the top and not the cylinder shapes of wound cane. At a time when much of the Amarnine precision had been lost, the Egyptian industry thus began to provide amphoresque forms. From the sixth century B.C. until the earlier part of the Roman period, there is little means of dating these rather uniform sand-core glasses on evidence of style and finish, though handle trails and neck and foot may sometimes be compared with the earliest blown work. If time-lag and torism are commonplaces of baroque glass-making, how much more are we to look for them in the narrow repertory of the Hellenic period.

Wound-cane containers, especially those of Hellenic form, have been found abundantly in the Eastern Mediterranean, especially Egypt and Cyprus and round the rest of the Mediterranean basin, Greece and the Greek Islands, Scythia and the shores of the Black Sea, Syria and Asia Minor, Italy, Corsica, Sardinia and the African Coast. They are fairly numerous in the museums of Europe and the United States, and in some private collections, and have been discussed recently by a Danish archæologist, P. Fossing, though without regard to the history of perfume. A statistical table with provenances and other details, would throw much light on the trade. Their contents lay between hygienics and cosmetics. We are concerned with "containers" in the industrial sense, made by the glassworks for the toilet trades, and exported full. They are notable for vivid contrasts of primary colours

and sometimes for neatness of form, especially in Amarnine times. They may be compared with the *galanteries* of the eighteenth century. It will not be doubted that these bottles of "beauty aids" were intended to catch the feminine eye, the little ladies of the Greek Anthology as well as the beauties of Babylon.

Mr. D. B. Harden has emphasised that cane code long overlapped the rise of inflation. It carried the prestige of the jewellery trades, whereas inflation was a

*Alterius fornacis secunda camera infima A. Media B. Suprema C.
Eius os D. Foramen rotundum E. Foramen quadrangulum F.*

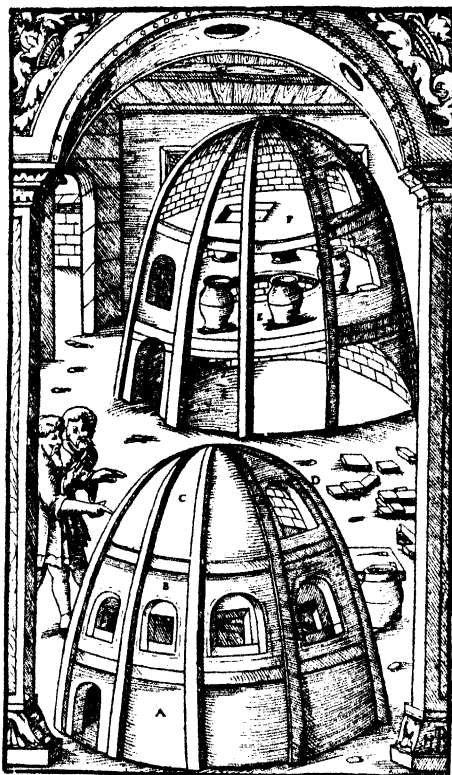


FIG. 4.—The Agricoline Working Furnace (*Secunda fornax*==
Glassofen)

Double cut (De Re Metallica Libri xii, p. 474), showing interior with glass-pots and foramen, corresponding with the exterior. Note wood blocks (for mould-making?); also that which Merret calls "The eye" is called here the foramen quadrangulum F; eius os is elsewhere translated *auge*.

relatively new and industrial process. It is cane code that has produced an eye witness's description of glass work, I think the only one in Greek and Latin. Its author, Mesomedes, was a writer of songs and light verse, and a Hellenic friend of the Emperor Hadrian (117-138 A.D.). He had a job in the Household, but he had his salary cut by his successor Antonius Pius (138-161 A.D.). He was a native of Crete. Two lively little poems on The Sphinx, with quips on the zoology of that animal,

suggest that his glass verses may have been written after a visit to an Egyptian glass-shop. The text, in Paton and other editions of the Anthology, cannot be quoted here. There is no reference to the act of blowing, the "wonderful sight" of blown-glass houses. We are concerned with the preliminary drawing of cane:

A workman, having broken off the frit, brought it. He put a lump hard as iron into [crucible on] the fire; and the frit, dissolved by the devouring flames, melted like wax. It was a wonderful sight to see the cane drawn molten from the fire and the workman on his toes in case the cane should fall and snap. He took hold of the lump in the tips of the pincers and . . .

This has been long misinterpreted, one scholar copying another since the seventeenth century. The word for "broken off" (κόψας) means "cutting off" or "breaking off"; there is no reason for referring it to the quarrying of stone for silica, a suggestion first made in the seventeenth century and repeatedly followed. The word translated cane (όλκός) is anything which draws (e.g., rope or trace) or is drawn (e.g., a furrow or a snake's track). Anxiety is common enough in spectators of glass-drawing; but the "trembling" (τρέμονται) of the workman only means "quick in movement".

As Dübner pointed out, the poem is unfinished. Otherwise we might have had a full description of vessel manufacture from cane. Of two or three translations, Dübner's is verbally the most accurate. The spirited version of Hugo Grotius (1583-1645), written between 1630 and 1645, is notable for the Pliny's accurate word *sequax*, and for Grotius' (mistaken) reference to the contemporary Italian glass industry, in which quartz pebbles (*quocoli*) were collected from the Alpine river valleys to provide clean silica:

*Artifex ex amne marmor
Abstulit pellucidum
Idque sic igni subegit
Ut solet ferrum faber;
Illud a flammis peresum
Fluxit ardescentibus
Cera mollis ut liquescit
Conspici mirabile,
Ut sequax educeretur
Ut timeret artifex
Massa ne dirumperetur
Quam duabus horridis
Inditam labris prehendit . . .*

The Roman appetite for treasures (however true) turned Egypt from length-cane to cane-slice. Canes bundled and drawn were cut in disc sections, and murrine bowls were thence assembled, probably by setting in hemispherical fire-moulds. We are concerned with a jeweller's code of glassmaking. Polychrome marbled wares were produced from cane by kneading, probably in a crucible, under heat. It may be suggested that casing pieces (like the Duchess of Portland's vase) were made as blanks for rotary sculptors, from cane on a core, without inflation. They are in that case a late *tour de force* of Egyptian process.

In mediæval times, *vitrum plumbeum Iudaeum scilicet*, an allusion to lead-glass pastes worked by Jewish jewellers in imitation of semi-precious stone, was

a commonplace in the Near East and in Europe, as the writer styled Pseudo-Heraclius bears witness. To such work also we must relate the *Lapidario* of Abolais in the Library of the Escorial. This was translated by Abolais about the sixth century A.D. from a Hebrew text, written for the jewellers, into Arabic, and at the instance of Alphonso X (El Sabio) was thence done into Spanish about 1248 by

*Fistula A. Fenestella B. Marmor C. Forceps D. Instrumenta quibus
formæ sunt datæ E.*



FIG. 5.—Scene in Glasshouse with the Working-Furnace in Work. After *De Re Metallica Libri xii*, p. 476. Note especially: (1) wood fuel, (2) wood handles of blowing-irons, (3) marvers, (4) absence of chairs, (5) moulds (? wood) suited to gadrooned forms of silver, etc., design, (6) Humpen with Nuppen, some crated, (7) bottles, some wry-necked, (8) straw-packing, (9) domestic scene, (10) bar, (11) master of the glasshouse costing on bench, (12) collection of cullet in basket.

Juda Mosca, a Jew, and Garci Perez, a priest. Some centuries later are the series of vessel fragments obtained at Fostat some years ago by Mr. (now Sir) Leigh Ashton, and now at South Kensington. The interesting thing is the skilful and repeated marblings done, as it seems, by kneading up from diverse cane, probably with some blowing. Cooking in a saucepan is no bad analogy. To such workshop manufacture we must ascribe many of the mounted vessels of

diaspro, or glass imitations listed with plate or jewellery in French noble inventories of the fifteenth century, and in the surviving sixteenth-century work of Venice.

The high lead content of gem-pastes was suited to low-temperature bench work. A limited fusion must have been obtained occasionally. A small blow-pipe inches in length was used by Renaissance modellers. A South German glassmaker's day book, entitled *Eis- und Ausschreibbuch der Gläser*, dating about 1680, gives an account of lamp modelling:

Diese kunst des glasblasens von allerhand thierlein vögelein glasslein Krueglein und mancherley sachen so von freyer hand ober einer brennenden lampen mit öhl gefüllt, durch ein rohr so unter ein sacklein von glass, darein der dunft sich samblet, geblasen wird, is in Italia lange zeit, sonderlich zu Mayland und Venedig üblich gewesen, dann in Niderland kommen, wie dann ungefehr is 1650 Abraham Fino von Amsterdam hieher kommen.

In the sixteenth and seventeenth centuries work of this Milanese type was widely distributed at Venice, Amsterdam, Antwerp, Rotterdam, Nevers, Nuremberg and elsewhere. It tended to follow the glasshouses, in order to get cane. The Ghandolfi glasshouses at Antwerp specialised in calcidonio which "*in bellezza e vaghezza di colori di grand lunga la [vera agata] superava*". At Nevers the toys and figures of the bench modellers were well known early in the seventeenth century. At Rotterdam in 1687 they sometimes worked at the glasshouses producing "*de petit boules émaillés et je ne scai combien d'autres jouets d'enfants, dont on fait un négoce considerable avec les Sauvages*".

One of the largest illustrations in existence of glass modelling, is the spinet No. 402-1872 at South Kensington (Figs. 6 and 7). It dates about 1600. There are reasons for thinking it was made at Antwerp, a centre for instrument manufacture as well as for the glass industry. It is of great rarity now, though in some sense the fashion then. The dimensions are L. 4 ft. 11½ in. (1315 mm.), H. 10 in. (255 mm.), D. 16½ in. (420 mm.). The spinet has been at the South Kensington Museum since the end of 1871, when it was bought for £140 from Monsieur Berger, of 120 Rue Neuve des Mathurins, Paris, presumably a Paris dealer. After its purchase it was reputed by the late Carl Engel and others "to have belonged to Elizabeth Queen of Bohemia". It long bore the astonishing label "made at Murano near Venice". Are both these vendor's yarns? The "eclipse and glory of her kind" was a possessor of virginals and an accomplished musician. Dancing sometimes took place in "glass salons", as at Heidelberg Schloss in 1613. But a look-out of some ten years has not produced support for the suggestion that the spinet can have been hers. We must be content to regard it as highly connected. "A small virginal all made of glass", at Hampton Court in 1599, was described by a German tourist as *parfumiert*, and bore the couplet

*Cantabis moneo quisquis cantare rogans
vivat in æternos Elisabetha dies.*

The interior of the lid at South Kensington is wholly covered with incrustations of cane strip, cane slice, and a variety of gem pastes and coloured crystals in a rather "perfumed" composition. The eighteen scenes in two equal rows, illustrate much engraved episodes in the *Metamorphoses*, among the two or three most popular children's books of the sixteenth century, a circumstance consistent with the view

that the instrument may have been made for a little girl. Editions appeared almost yearly, and translations or adaptations were made in many languages. Illustrations tended to follow a convention of the more picturesque stories or of episodes in them. The labelled scenes belong to the same general type as the illustrations by Virgil Solis of an edition of the *Metamorphoses* published at Heidelberg in 1563 by Johan Sprengius *Una cum vivis singularum transformationum Iconibus a Vergilio Solis, eximio pictore, delineatis*. Some figures are broken, and some scenes seem hardly more than exercises in landscape relief with an Ovid caption. It is very possible that the firm picked illustrations of suitable shape and size from several illustrated books or working drawings.

There remains the code in England. Michael Sigismund Hack (d. 1724), member of a family of wrought-glass artists, was working in England before 1672. But here bench work took not unnaturally a rather textile turn. The eagle-eyed Celia Fiennes discovered glass-spinning at Nottingham in 1697, and compared it with stockings:

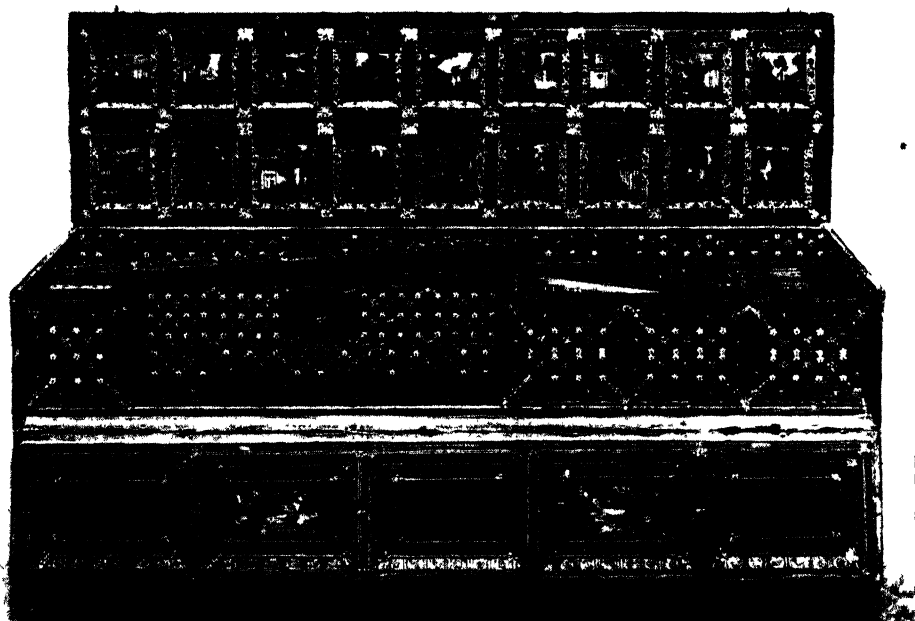
“ the manufacture of the town mostly consists in weaving of Stockings, there was a man that spunn Glass and made severall things in glass birds and beasts, I spunn some of the glass and saw him make a swan presently, with divers coulloured glass he makes Buttons which are very stronge and will not breake”.

—There are other eighteenth century notices of similar itinerant glass artists. Glass as thread is seen to great advantage in the English counterpart of the *jouets d'enfants* of Nevers, the beautifully rigged ship models of the late eighteenth century and after. These were sometimes bottled for safety, but may be 2 ft. or more in length. Fox-hunting, table-decorations, coaches, dog-carts, spinning-wheels, glass pens, and other models of the nineteenth century and after are highly characteristic of English work. To this native tradition has been added in late years the work of craftsmen from Central Europe, some of them immigrant, to be seen now in many shops. This is truly *Kleinplastik* in glass. Its birds and beasts use the “sequacity” of glass brilliantly for stylisation and they have the teutonic feeling for fantastic toys of a Mickey Mouse kind. But it must be admitted that they are un-English.

2. *The Origins of Inflation*

Discoveries of Assyriology, published in the years preceding the war, largely by the late R. Campbell Thompson, alter the set of glass-history in pre-Christian times. The earliest indication of the reverberatory furnace of mediæval glassmaking has hitherto been the story in Evagrius of the Jewish glassmaker at Constantinople in the Episcopate of Bishop Menas (531–565 A.D.) who lost his temper with his son or “boy” and “threw him into the furnace in which he used to make his glass”. Reverberatory furnaces have not been found archæologically at earlier dates, but their use since at least the first century B.C. has been certainly presumed from the large number of inflated vessels which have been found in Roman times. The new information is the earliest literary record of the plant and processes of glassmaking. The particulars given point to reverberatory beehive furnaces of the kind familiar in Agricola, Neri, Merret, Frisius, Kunckel, Haudicquer de Blancourt, the *Dictionarium Polygraphicum*, the learned Ephraim Chambers, Dossie and Pellatt.

These particulars are given on a collection of clay tablets with cuneiform inscriptions formed by Ashurbanipal (668–626 B.C.), some of them deposited by him in the Temple of Nabu at Nineveh. The text was written in columnar form, and is in several recensions. No author is given, but the readings *Nur-* and . . . *daiani* may be incomplete names of authors. The details fall under three main heads: (a) plant and process; (b) ritual accompaniments of the work; and (c) prescriptions for glasses and glazes. I refer only to (a), the most interesting historically.



By permission of The Victoria & Albert Museum

FIG. 6.—The glass virginal in the Victoria & Albert Museum. Incrustation of length cane, pearl flowers, lamp-modelled glass and paste marquetry. It is 4 ft. 11½ in. in length. (See description of panels on page 475.)

Glasshouse.—The term *Bît Kuri*, “house of the furnace”, is better understood of the house containing the furnace, as in the English *glasshouse*, German *Glashütte*, rather than of part of the furnace structure; Thompson suggests this as one possibility.

Furnace I.—Three furnaces are mentioned. The first, called *Kûri ša abni*, “furnace for metal”, is probably to be associated with the fritting furnace (the first of the three medieval furnaces), the Italian *calcaria*, Merret’s *calcar*, English works-word *caulker*, in which the batch was fritted.

Furnace II.—What appears to be the founding furnace (“that where the workmen work”) is termed *Kûri ša siknat ênâtepl-ša*, “furnace with a floor of eyes”. This is an interesting description. In Italian usage and in Merret the eye (*occhio* or *lumella*) was, as the illustration will show, the circular opening between the siege (middle or founding) story of a three-story furnace and the upper or annealing story (tower). The fire, rising “from the midst of the eyes”, was made on the lowest part (*saplîta*).

The sovereign merits of this conical furnace have been described by Mr. A. C. Pilkington, who speaks of it having "its outlet at the top and containing a floor pierced with 'eyes' beneath which was the fuel". It "could be made to reach a good temperature, say perhaps even $1,000^{\circ}$ to $1,100^{\circ}$ C., and the secret of its success would be its height and the shield of flame round the centre space . . ."

Furnace III.—The Assyrian term is *Kûrî sa dakkanni* or *Kuri 'sa dukkanni*, the "furnace of the arch". In this was a *bâb Kûri*, "door of the furnace", through



FIG. 7.—Detail of centre panel of glass virginal (see description of panels below.)

UPPER ROW (left to right)					
No.	Label	Subject	Reference in the Metamorphoses	Sprengius Edition Reference and Caption	
1	Wanting ...	Woodland scene with archer? on foot at the release	...	...
2	Triumphus Bachi ...	The Triumph of Bacchus (figures beneath trees and thatched hut)	III, 511-733	p. 44 Bacchi Sacra seu Triumphus (III, 518 Bacchica sacra).	
3	Narcissus ...	Narcissus kneeling before a fountain	III, 339	p. 43 Narcissus in flore	
LOWER ROW (left to right)					
1	Atlantiades ...	Story of Hermaphroditus, called Atlantiades	IV, 285ff.	...	
2	Diana ...	Diana surprised by the hounds of Actæon	III, 209ff.	...	
3	Arcades ...	Transformation of Lyeaon, King of Arcadia, into a wolf	I, 218ff.	...	

which was introduced what Dr. Thompson called the "metal", probably the finished articles for annealing. This appears to correspond with the third of the mediæval furnaces, the annealing furnace or leer in which the articles were placed on the upper story. Leer (*Lehr*) seems to be an entirely German word; "tower"

seems to connect with the single tower furnace of the Hrabanus illustration of 1023 (Fig. 1).

Fire.—The fuel was *sarfatu* wood, probably styrax, cut in Ab, a hot month, and stacked under leather tarpaulins. The anonymous translator (1699) of Haudicquer de Blancourt still maintained that wood made a better glass fire than coal. The "good fire", *iṣatu ṭābtu*, was made in the *saplita* and rose up "between the eyes", i.e., from the lowest story into the middle story of the furnace. The duration of the found was given as seven days.

Frit.—The difference is not clear in the phraseology between the batch, or mixed but not yet melted materials, and the frit, the result of the melt in the fritting furnace; "*billu* and *abnu* are both used to indicate the mixture or 'melt'".

Utensils.—The glass-pot (*taptu zakutu*) had to be clean. It was stilted so that it did not touch the ceiling of the furnace (*nīmedu*, stilt or support). Several sorts of mould appear to have been used. The mould (*tamšiltu*), and the "duplicate" (*tašne*) which closed it, appear to refer to female and male moulds. The base (*iṣdu*) of the mould might also be covered (*eṣū*). Open flat moulds or pans (*haragu*) might be "not closed" (*la eṣete*), or "closed" (*eṣete*), or "covered but not closed" (*ṣaktumte la eṣete*). It is not clear what precise types of mould are meant; they may well include types in which flat and hemispherical murrine (*millefiori*) bowls were later moulded from cane slice. The rake (*mutirru*), with its notable Syrian equivalent *matṭāra*, Roman and later Latin *rutabulum*, seems certainly to correspond with the wood-handled iron rake of medieval use for stirring the matter and "the frit in the first oven" (*The Art of Glass*, 1699, cut at p. 31, K). The ladle (*su'lu*) is to be related to the mediæval "great ladle" of iron with wood handle for shifting metal from the larger glass-pots to the smaller and the "little ladle" for skimming the sandever (*ibid.* F. G.). Tools apparently similar are called *malanu* (?), slide, and *tamrata* spoons.

In all this the battle was for heat, sustained as well as intense. The reverberatory furnace, providing this, was the pre-condition of inflation. The cuneiform discoveries are consistent with the high reputation of Syrian blown glass in Pliny's time, as with Mr. Harden's Sidonians. Their tendency is to leave Egypt her cane, and to bring out the cinderella of Assyria as the source of the blown code. They also argue the possibility of inflated glass in occasional instances before the main development of the first century B.C.

The new process, the first method of producing hollow ware by breath, engaged the Roman market as a mode of mass production. From the first century B.C. many of its vessels have the air of being ripped off the blowing-iron at a great rate. Handles and ornament also were trailed quickly. This speed gave early inflation a pace and spontaneity like fresco- or enamel-painting. The operator could not think twice. His natural blown-up shapes, in which the greatest volume was set low, were in contrast with the ceramic form of Hellenic tradition, bulging high. The resulting play of volume and profile gives this so-called Roman glass a classic place, like that of T'ang and Sung in ceramic history. Its invention shrank in later centuries to the few fine vehicles of Islam. The hard horny metal was against it, and ornament was the main thing. But the beauties of blown form have never been seen better than

in the later tradition of the Near East, the Persian and Turkish sprinklers and other bottle forms of the sixteenth and seventeenth centuries.

IV. CONCLUSION

I should like in conclusion to say how sensible I am of the privilege of reading a paper in this beautiful room of a Society which did so much in the time of William Lewis and Robert Dossie, for the encouragement of the arts and industry of glass. In our specialist world any kind of historian, not least the art-historian, is at a disadvantage. He is confronted with a world which was not specialist. Before the Industrial Revolution, everyone did everything: optics and navigation, chemistry and painting, the Natural Philosophy and the Grand Tour. The fields were not of such terrifying size. Amplitude of approach is the more than ever needed now though inadequacy be the price to be paid for it.

No one will suggest that the artistic activity and the scientific activity are other than entirely different. But it was under the civilising influence of the Natural Philosophy, the auspices of the Royal Society and the Royal Society of Arts, that the arts in England reached, during the eighteenth century, their highest development. Of that unison now, there could be no better instance than the distinguished designer whose place it is my unhappy honour to try to take this afternoon.

The late James Hogan was not only in the front rank of stained glass-designers, here and in America. Nor is it enough to say that he was a director of a celebrated and traditional firm, an accomplished designer of domestic glass, mediævalist collector, historian. He had glass and a sense of glass at his finger tips. He was thus able to knit together technology and history, production and design, into an understanding of glass as a whole.

DISCUSSION

QUESTION: Perhaps the lecturer would be good enough to tell us something more about the tulip which he referred to as a basis for the design of modern glass.

MR. W. A. THORPE: I think it is certainly true that the three-piece form in Venetian glass-making in the sixteenth century is based on some flower form, or is suggested by it. In ancient times I do not say that you do not get stemmed vessels of glass at all, though they are very rare. There have been later stemmed vessels of silver, of a very different kind. But there is nothing in glass quite like the very delicate sixteenth-century glasses with flower-like bowls and slender stems which are far more like a flower than anything else. Horticulture was much canvassed in the sixteenth century not only in connection with the tulip but for a number of other reasons. In and after the sixteenth century actual imitations of flowers in gem-paste or coloured crystal were used by glassmakers in decoration of stems, branches, etc.

THE CHAIRMAN: I mentioned at the beginning that Mr. Thorpe always seemed to have a great reserve of knowledge if only time permitted, for that is my experience of him. I had not heard a word before of what he has said this afternoon: it was all delightfully new to me. I said that he would be a very good courier, and he has indeed taken us a real roam round the world not only in space but in chronology—he was almost Einsteinian in a time-space fashion. If you have all followed him with the same extraordinary interest and delight that I have, I hope you will all let him know in a very hearty manner.

The vote of thanks to the lecturer was accorded with acclamation, and after a vote of thanks had been given the Chairman, the meeting terminated.

INDIA, PAKISTAN AND BURMA SECTION

Thursday, February 5th, 1948

FORESTS AND FORESTRY IN BURMA

By D. J. ATKINSON, O.B.E., I.F.S.

Sir HENRY H. CRAW, K.B.E., C.I.E., *in the Chair*

THE CHAIRMAN: Ladies and Gentlemen, I am very sorry to say that Sir Reginald Dorman-Smith who was going to take the chair at this Lecture is ill and is unable to attend, and I have been asked to take it in his place and introduce Mr. Atkinson. I do not feel competent to say very much on this subject, but as you know from the programme the title is "Forests and Forestry in Burma". I will now call on Mr. Atkinson to give his lecture.

The following paper was then read:—

The location and geography of Burma is presumably known to most of you, but nevertheless I will start by showing a map of the country. One must in these talks burden the audience with a modicum of statistics, but I shall endeavour to make them as palatable and as short as possible.

Now Burma, although small in comparison with her enormous neighbours, India on the one side and China on the other, is no mean country, covering an area of a quarter of a million square miles. That may not mean very much to some people, so I will put it in this way. Burma is appreciably bigger in area than either France or Germany, both of which cover about 200,000 square miles, and she is about three times the size of the United Kingdom. The general shape of the country is that of a diamond, with one long finger down the Malayan coast. Burma is some 1,300 miles long, and 500 miles across. The map indicates by the lighter shading the forest area of the country, while the dark shading represents the reserved forests constituted as such under the Burma Forest Act. It will be clear to you, therefore, that Burma is primarily a forest country.

Of the total area of 250,000 square miles, about 145,000 square miles, or 60 per cent. of the country, is under forest. By and large the forest of Burma is forest as understood by the ordinary man in the street. It is not scrub jungle with a few odd miserable trees over a sea of grass, as much of Africa is, and indeed much of India too. India, Burma's nearest neighbour, has 20 per cent. of its area covered by forest; but although it is four times the size of Burma, the actual area of land classed as forest is not very much greater than that of Burma, being about 170,000 square miles to Burma's 145,000.

I am afraid the map does not show the physical features, but the natural features of the country run north and south, as our troops in the war found to their cost because, coming in from the west, they had to cross alternate ranges of mountains and large rivers. There is an outer semi-circle of hills starting from the Arakan Yomas in the south-west and running up through the Chin, Lushai, and Naga hills, round the Hukawng Valley to the Triangle of the Kachin Hills. The Triangle includes the headwaters of the Irrawaddy, the Mali and the Nmai joining together to form the Irrawaddy. Then comes the Salween-Irrawaddy Divide running up to 15,000 or 17,000 feet, which forms the theoretical boundary between Burma and China. The boundary thereafter follows the Salween, except where the river cuts across the Shan

states, which project in a long finger into Indo-China and Siam. The Salween is one of the major rivers of Burma, running south and finding its way to the sea at Moulmein. The Irrawaddy, as I have just said, starts up in the back of beyond in unad-

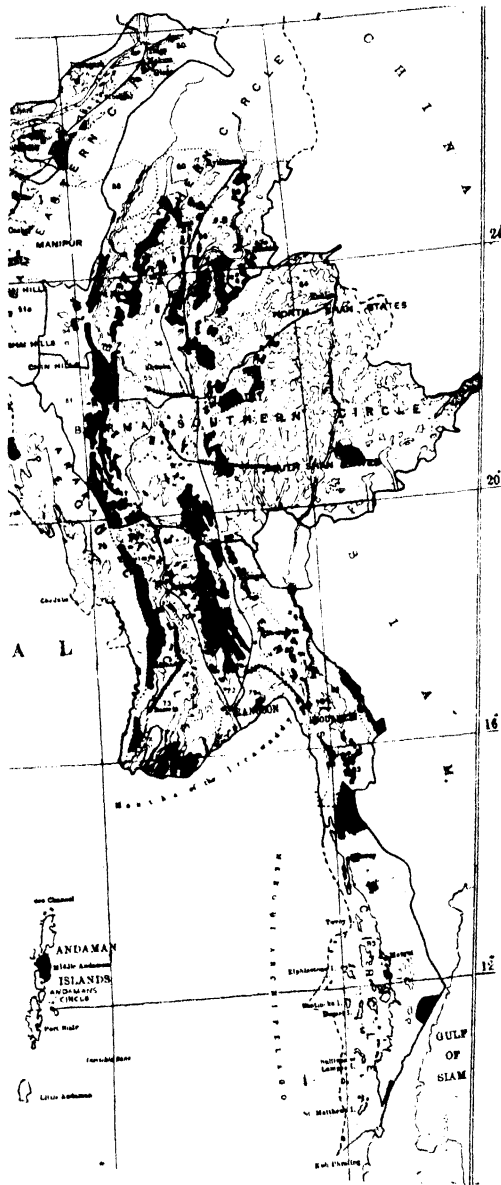


FIG. 1.—Map of Burma, showing forested areas (light shading) and Government Reserved Forests (dark shading).

ministered country beyond Fort Hertz, and follows a track more or less down the centre of Burma, being joined by the Chindwin just below Mandalay, and finding its outlet at numerous mouths, which form the delta of the Irrawaddy, between Bassein

and Rangoon. East of the Lower Irrawaddy, starting just north of Rangoon, run the Pegu Yomas, a most important part of the country from the forest point of view.

In this very large expanse of forests extending over 145,000 square miles there are, as you will understand, many types. The forest is not all the same. The distribution of the various types naturally follows climatic and physical conditions—rainfall precipitation chiefly, altitude, soil, and so on. Being in the tropics, Burma is chiefly a wet country. The rainfall varies from something over 200 inches in and around Moulmein to 30 inches in other parts. These 200 inches of rain are concentrated within at most five months of the year, and that means an average of well over one inch of rainfall per day. Those of you who have experienced an inch of rainfall in any one day will realise what it means to have that amount of rain every day for five months on end. The rainfall varies, as I say, from a heavy fall of this nature down to a negligible fall in the dry zone—the white patch in the centre of the country—where it drops to as little as 30 inches.

The black spots along the coast, and at Mergui and Tavoy, represent the tidal forests, consisting largely of mangroves. These are horrible places fit only for the snakes and crabs that inhabit them, feet deep in mud, with the roots of the trees sticking up out of the surface of the mud in what are called pneumatophores. It is quite impossible to traverse these places other than by boat, but fortunately the areas are ordinarily everywhere intersected by creeks and it is comparatively easy to visit them by this means. They are similar to the well-known Sundarbans of Bengal and the Brahmaputra, the species of trees being much the same. The Sundarbans take their name from *sundri* [*Heritiera fomes*], which is also one of the main species in Burma. They are important to the internal economy of the country because they produce large quantities of fuel, the species *kanazo*, *sundri* in Hindustani, being the most excellent for this purpose. Rangoon and the other main towns of Lower Burma obtain their fuel supplies very largely from these tidal mangrove forests. They also produce for Rangoon large quantities—as much as 700 tons a month—of mangrove bark, which is used for tanning purposes. But they are of no particular importance so far as the export market is concerned.

Then there is the tropical evergreen—a second type of forest and the nearest approach to the layman's idea of tropical forest as derived from such films as "Trader Horn". The trees are in several storeys, the trees of the top storey, the giant evergreens, running up to anything like 175 or 200 feet, with two or three distinct storeys below, and a forest floor covered with bushes, small trees, and, in some places, bamboo, which is usually of a prostrate habit and therefore all the more difficult to negotiate, together with canes, all armed with the most fearsome hooks, and leeches.

Tropical forests do not normally consist of gregarious species such as in the coniferous forests of the west, where most of the trees are of the same or closely allied species. The tropical forests are normally extremely mixed. That is true of the tropical evergreens, and of most of the other types of forest. We have, however, certain types that do not conform to the normal pattern for the tropics. There are the hill pine forests. In the Shan states at an elevation of 4,000 or 5,000 feet one gets *Pinus khasia*, named from the Khasi Hills of the Indo-Burma frontier, which is pure. It is not at the present time of any economic importance because its location

is too distant from any market, and other than locally the trees are not used; but there is a promise. They are there in large numbers pure; they are extremely productive of resin, and to my mind there is no reason why some day they should not be worked for the production of resin. There is, as most of you know, a flourishing



FIG. 2.—Pure forest of in (*Dipterocarpus tuberculatus*), known in Burmese as indaing—Yinke Reserve, U. Burma.

industry in Northern India centred on Clutterbuckgunj, a name which perpetuates a previous Inspector-General of Forests in India, where large quantities of resin and turpentine are produced annually. I see no reason why that should not be done in Burma. Just before the last war there were inquiries from Indian firms as to the possibility of starting a similar industry in these pine forests of the Shan states.

There is another type of forest peculiar to Burma which is of a gregarious nature, the so-called *Indaing* or deciduous dipterocarp forest, normally found on lateritic

and sandy soils, and coming to its best in the region north of Mandalay and just east of the Irrawaddy, around the mouth of the Shweli River.

There are many square miles of this *Dipterocarpus tuberculatus* forest, practically pure. There are, of course, odd trees of other species, but to all intents and purposes the forest is pure. It corresponds very closely to the *sal* forests of India, *sal* [*Shorea robusta*] being another dipterocarp. The timber is called *in* in Burmese, and is usually conjoined with that of another dipterocarp, *kanyin*, and is on the market in this country as *gurjan*, its Indian name. It is a heavy resinous timber, very useful for major constructional purposes, *kanyin*, the partner of this particular species, being for some curious reason extremely resistant to the marine borer, the teredo, and therefore of great use when treated for the purpose of wharf piling. There are very few timber species that have any resistance to the marine borer, the greenheart of Guiana being the best known.

We now come to the most important type of forest in Burma, the mixed deciduous forest, at its best along the Pegu Yoma, and in the Mu Valley of Upper Burma. These mixed deciduous forests contain the timbers of primary importance—teak, *pyinkado* (*Xylia dolabriformis*), *padauk* (*Pterocarpus macrocarpus*), and so on. They are the source of much the greater part of the forest revenue of the country, and it is our most important type.

The term "mixed deciduous" is appropriate. These forests are extremely mixed. The forest flora of Burma runs to just under 5,000 species. That, of course, does not mean they are all trees. It includes trees, shrubs, climbers, grasses. You may wonder why we include grasses, but you must remember that the bamboo is a grass. It also includes such plants as rhododendrons, orchids, and in fact any plant found in the forest. Five thousand species, you say! But what is 5,000? It is nothing to me in my present job, where I have to deal, I am credibly informed—I have not counted them—with 130,000 species—of beetles, represented by 3,000,000 specimens, any one of which I am supposed to be able to track down. So that 5,000 is nothing very much. But it is not so easy to know even a reasonable proportion of the 5,000, and there have been very worthy and well-known forest officers who have claimed to be able to recognise no other tree than a teak tree.

There is in certain places an important type of forest—potentially a most important type of forest—which we have not yet mentioned, and that is the practically pure bamboo forest of the Arakan Yoma. The bamboo (*Melocanna bambusoides*) is called by the Indians *muli*, and by the Burmese *kayinwa*, and it has the rather unusual habit for a bamboo of being a non-clumping species. As you are aware, most bamboos grow in definite clumps, and the ground between any two clumps is free of the bamboo altogether. *Muli*, on the other hand, grows by sending up shoots every foot or so from an underground root, and does not clump at all. The jungle is therefore practically impossible to get through because of this habit. It is of considerable potential importance because by reason of its habit of growth it has prevented the successful establishment of any tree species over many hundreds of square miles in Arakan, and formed very large areas of pure bamboo forest, potentially a source of vast quantities of paper pulp. It has been examined on more than one occasion with this object in view, and it has been estimated that the forests could produce, without any serious disturbance to the inhabitants, nearly 800,000

tons of pulp a year. The project has never materialised to date, and I am afraid it is somewhat doubtful now whether it ever will materialise. The Burman's objection to calling in foreign capital and his desire to run his own show have together militated against the project ever coming to anything, but so far as the outside world is



FIG. 3.—Upper mixed deciduous forest, with teak (*Tectona grandis*) over tinwa bamboo (*Cephalostachyum pergracile*).

concerned there is this very large source of pulp, for which, of course, the world demand becomes greater every year, lying there available.

Let us revert to our mixed deciduous forest, the most important type of forest that we have in the country, of which the principal component is the teak tree, *Tectona grandis*, a species of the natural order Verbenaceae.

Teak does not grow gregariously, but is scattered throughout this mixed forest. Any country below an elevation of about 3,000 feet, and having a rainfall of 60

to 120 or 130 inches, is likely to be productive of teak. Before the war for many years we had achieved in Burma an annual out-turn of about 450,000 tons. When I mention the word "ton" I refer to the cubic ton of 50 cubic feet, which has no reference to the weight. Teak is, without qualification, the world's finest general utility timber. In all the qualities that distinguish a good timber—resistance to shock, strength as a beam, weight, freedom from movement, and so on—it compares favourably with any of the ten generally accepted best timbers of the world. There is only one particular quality—that of resistance to shock—in which it has to give place to ash and hickory, and one of our own Burma timbers, *yom* (*Anogeissus acuminata*), and these are therefore used for tool handles, pick-axe handles, hammer handles and so forth, in preference to teak or other timbers because they do not shatter under repeated hard blows. Otherwise teak at 43 lbs. to the cubic foot compares favourably even with oak at 46 lbs. per cubic foot, and mahogany at rather more, and most of the other species of Burma and other tropical timbers.

As far as freedom from movement is concerned it has them all beaten easily. It is a delight to work, and although not used primarily with that object is of very pleasing appearance when made up into decorative furniture, and so forth. Its primary use is, of course, in shipbuilding, where the essential oil contained in the timber has the most desirable property of non-corrosion of the metal fittings, the metal decks on which it lies and the bolts that stay it down. It is of great use for railway carriages because of its freedom from movement—doors do not jam—and for any outdoor use. The seats in the Parks are almost sure to be made of teak. They are unpainted, but they last for ever.

The "Cutty Sark", one of the famous tea clippers of the 1860's, was built of Burma teak in 1869. She was still afloat at the beginning of the last war. She may still be afloat for all I know, but even if not, her teak will be as good as when put into her, and will have been diverted, after the breaking up of the ship, to some other use. This ship was capable of 17 knots, and on one occasion was known to have logged rather over 360 nautical miles in a day.

We have fortunately large quantities of this most excellent timber in Burma. Teak occurs also in India, Java, Siam and Indo-China, but the total production from all these countries is less than one-third of that of Burma. As I have said, the production of teak in Burma is 450,000 tons a year in the round, but of course one has to reckon on a loss of very nearly 50 per cent. in conversion, so that in the converted form that represents about 250,000 tons. Under the management that the Burma forests have received for the past ninety years, and which one hopes they will go on receiving, there is no reason why that quantity of teak should not be produced for the world's use *ad infinitum*. The forests are there, and, provided they are properly managed, the extraction of 450,000 tons a year is not wasting any of the capital value of the forest. It is merely removing the natural increment.

In the utilisation of the timber, the Forest Department is entirely responsible for the selection of the trees that are to be felled. With the exception of a fairly extensive forest that has always been retained in the hands of the department for its own working, the timber is actually extracted by commercial agencies. The selection of the trees is, however, entirely in the hands of the Forest Department, the officers of which are, of course, all trained foresters. Teak, although only 43 lbs. to the cubic

foot—and that for tropical timbers or most hardwood timbers is reasonably light—will not float in the green state, and it is therefore always girdled or ring-barked. The tree is killed by having a two-inch wide groove cut into it as low as possible. The sapwood through which the sap ascends to the leaves is therefore cut, and the tree dies. It stands in that state for a minimum of three years. In certain places it

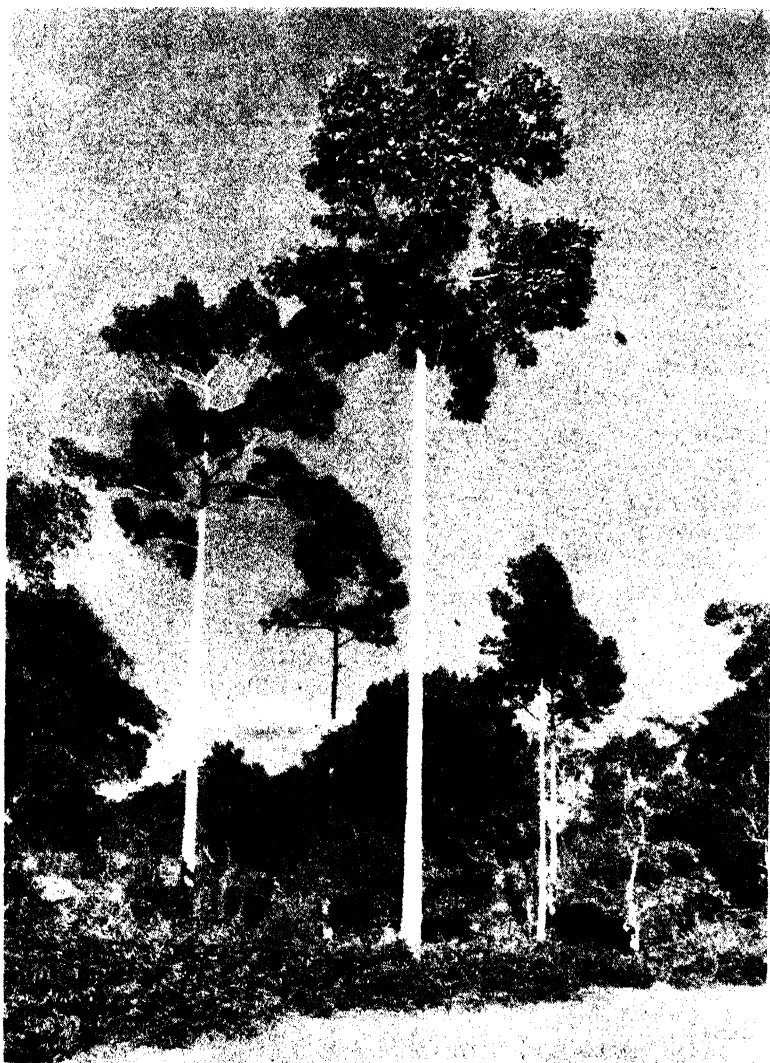


FIG. 4.—Kanyin (*Dipterocarpus alatus*) over secondary regrowth on edge of cultivation

Burma it has to stand even longer. The forests of Upper Burma around Indawgyi, the big lake from which a number of Wingate's Chindits were flown by seaplane, are so low lying that the extraction agency has always suffered from a very large proportion of what they call "sinkers", *i.e.*, logs that will not float. Girdled timber is

commonly retained standing in those forests for four years before it is felled.

Girdling is probably one of the most physically energetic jobs one can be called upon to do. One leaves at dawn, takes some food with one, and comes back at dark, and the intervening hours are spent covering every square yard, at least visually, of the area over which one is working. Teak grows normally in country that is extremely severe, and when girdling one has to follow the lie of the country and the map exactly. One must never cross a stream. One descends a precipitous spur knowing one has to ascend it again on the other side. And so you go on all day, with a couple of foresters and a gang of coolies, selecting the trees that are to be girdled and recording and mapping all other teak trees over 4 feet in girth.

After girdling, as I say, the trees stand for three years, and the extraction agency then comes along to undertake the felling and logging, and the further business of extraction to the milling centres.

The extraction agency has, of course, to work to a plan just as the Forest Department also works to a plan, the plan indicating which compartments are due for girdling, and covering the forest on a cycle of thirty years. That is to say, it is normally thirty years, from the time a compartment—*i.e.*, a unit of management of the forest—is girdled until the time it is girdled again, during which time one has covered the whole forest doing one, two, or more compartments a year. The extraction agency has to work to a plan because limitation of fodder and water and so forth determines the number of working animals they can put into any given compartment or small area of forest, and it may be necessary for them to work a compartment here, one over there, another to the north and another to the south, rather than work two or three compartments in a block, because there would not be enough food, and possibly water, for the animals.

After felling and logging, the elephant comes into its own. It is impossible to conceive of timber being worked in tropical forests like Burma at great distances from the main extraction routes without the use of elephants. There is no doubt that the advances made during the war with mechanical extraction will continue, but I cannot believe any machine will ever take the place of the elephant. The trees are dotted about all over the place, one rarely gets more than two or three logs in one spot, and it may be necessary to pick one's way delicately between rocks or between growing timber, and in other places where it is quite impossible to imagine a machine ever being able to work.

From the stump the logs are normally dragged to what is euphemistically described as a floating stream. That, in nine cases out of ten, is a tiny, completely dry little channel, possibly two feet or a yard across, and it is unbelievable to the uninitiated that a stream of that size could ever float large logs. But there one gets down to the question of tropical rainfall. Until one has seen it, it is difficult to imagine how much water can in a few minutes be collected into one of these at other times of the year completely dry small streams. The teak, having stood for three years, is reasonably buoyant, and it may be that two or three inches of rain has fallen within a few hours in the catchment area of the stream, and a spate of two or three feet in height will come down, which is quite sufficient to float the logs. At times these will be held up against rocks and snags of various kinds. Though the streams that are going to be used have usually been treated by the extraction agency before

that, being cleared of debris, and rocks being blasted out of the way, a number of logs will always hang up, and the elephants are again used to move them. They follow down the streams during the rises, and push the logs back into the channel or break up jams.

Gradually in the course of two or three rains, if lucky, the logs will be floated down the smaller streams until they arrive at the measuring station at the outflow into a major stream or river, where they can be built up into rafts, in which they will go down to the mills in Rangoon. It may be anything from five to twenty years between the time a tree is girdled and the time its component logs reach the mills in Rangoon. Of course the tree stands, as I have said, for three years before it is felled, but it may take several more years for the logs to get out to the rafting station.

I have not time to deal with the question of royalty payments. This is the system



FIG. 5.—Felling a girdled teak tree. The tree has stood for three years since being killed, and is now partially seasoned and floatable

by which the Government obtains its revenue. The timbers are worked under lease, which gives the lessee the right to the extraction of all timber made available to him by the Forest Department, and payment of revenue is in the form of royalty on the measurement of the timber. That is normally done at the rafting station, and it entails the examination and measurement of each log in the water. They are more or less tied together, but still it is quite a precarious business, and one has to watch that one does not slip and go under the raft.

Nor have I time to say more than a word about the regeneration of teak by *Taungya*. This is an age-old custom, cutting down a bit of the forest, burning it, sowing a one-year crop, and moving on the next year to do exactly the same in another bit of forest. The primitive peoples of all countries in the world have

adopted this system of shifting cultivation with, in many countries, disastrous effects. The Forest Department has, however, turned it to advantage in that in a land-hungry country it encourages this cutting on condition that the cutters plant a tree species with their crops, so that when they move on the following year to cut down another piece of jungle they leave behind an embryo plantation of teak, or some other useful species.

Now there are, of course, other species than teak. *Pyinkado* (*Xylia dolabriformis*) is probably of the next importance, next to teak in the royalty it brings to Government, and it is of great value, as being an extremely heavy and strong timber, for railway sleepers and other heavy construction. The tree is a beautiful tree with a reddish flaky bark, and shiny leaves rather like large pea leaves, and a delightful flower like an acacia, which is one of the great compensations for the Burma hot weather. The tree flowers in the hot weather, and the smell, usually combined with that of burning jungle, is quite delicious.

Kanyin, one of the big dipterocarps (*dipterocarpus alatus*), is a very fine tree, with a good timber, known in the external market as *gurjan*, and obtainable in this country.

Padauk (*Pterocarpus macrocarpus*)—a tree the timber of which is of probably as much value and as good as that of *pyinkado*, useful for gun-carriages, and therefore in demand by the ordnance factories. It is also blessed with a delightful flower, said to appear three times before the rains—last year it certainly flowered *five* times before the rains came! They are beautiful little orange flowers, very sweet-scented, which the girls love to put in their hair. To quote one of our local poets: "When my cutie comes to town, she wears a bunch upon her crown".

Thitya (*Shorea obtusa*), *ingyin* (*Pentacme suavis*), *taukkyan* (*Terminalia tomentosa*), *pyinma* (*Lagerstrœmia flos-reginæ*), are all timbers of importance, not only to the country but to the world.

Now I should like to say a few words about minor forest products. Bamboo is, I suppose, the minor forest product of greatest importance, certainly in the economy of Burma. Anything can be done with bamboo. People make their houses of it, floors and walls—they even roof their houses with it. They can cook in it. They carry water in it. They can do practically anything with bamboo. They make baskets with it, and carry their chickens to market in it.

Edible birds' nests are a curious minor forest product. They are of considerable value. The right to collect is sold by auction, and has produced as much as 20,000 rupees a year. The nests are made of the inspissated saliva of a species of sea-swift—the name of which I will not burden you with—and are found in the island caves of the Moscos group in the Mergui Archipelago. These islands are just hollow rocks, forming very extensive caves inside which these swifts nest. The nests are stuck against the walls of the caves, and are collected by the Dyaks on behalf of the concession holder. As you no doubt know, they are in great demand by the Chinese as a delicacy. They use them for soup. As a minor forest product it is of interest as bringing in a certain revenue.

Probably the minor forest product of major importance is the elephant. I have already said that without the elephant the timber industry in Burma would be almost impossible. We had before the war about 6,000 so-called domesticated

elephants—so-called because many of them are only domesticated to the man who looks after them—and possibly 5,000 wild elephants. A large number of the 6,000 have gone—killed by the Japs, over-worked, driven off into neighbouring countries—and when I left Burma, we had collected only about 3,000, about 50 per cent., if as many, of the original 6,000. The wild elephants are presumably still there, although no doubt disturbed to some extent, but it will be a number of years before sufficient have been caught and trained to replace the casualties of the war. I wish I had time to tell you something about that most interesting and often thrilling forest side-line, the catching of wild elephants in *Kheddahs*, and their subsequent training.

Other minor forest products of some importance are “lac”, the secretion of a small sap-sucking insect, giving the shellac of commerce, used for insulating purposes, gramophone records, etc., and “cutch”, a water extract of the wood of



FIG. 6.—Elephants dragging teak logs to road-head, whence they will be lorried to the main river

Acacia catechu, extensively used for dyeing and preserving sail cloth and fishing nets.

Before I stop I should say a word or so about the history and the organisation of the Forest Department, which had the distinction of being the senior department in the British Empire, having been established in 1856 by Brandis, one of the famous old Germans to whom the British Empire owes its original training in the art of forestry. Brandis was in Burma for three or four years, and set up the Forest Department in 1856, and was then himself moved on to become the first Inspector-General of the Indian Forest Department. Since that day the Forest Department has gone ahead steadily, and it is sad to think that a month ago to-day, the fourth of January, the senior and oldest, and one of the biggest Forest Departments in the Empire ceased to exist.

We leave behind a number of Burmans who have been trained in England, and we cannot do other than wish them well and hope that they, and the Government that controls them, will carry on in the way they have been trained, and will follow the examples of management that have been given to them. The forest estate is one of the most valuable in the world, I suppose, and it has in the past been managed in such a way that it has each year become of increasing value, and has brought in an increased revenue to Government—a part of the general revenues of the country that they can very ill spare.

Our successors in control have been wise enough, I am glad to hear, to retain for the time being my successor as Forest Adviser and two senior British officers as Conservators of the two research circles, but otherwise all Europeans have left and the department faces a difficult future in a country with enormous commitments, and an enormous problem of reconstruction ahead of it, with a very depleted staff and little hope of being able to increase it satisfactorily for a number of years. You cannot make a forest officer in a day. They have got rid—one understands the reasons, of course—of twenty-five or thirty European forest officers, which is quite a large proportion in a staff of eighty, and they are going to find difficulty in replacing those men quickly.

There are two dangers, as I see it, that face the Forest Department in Burma. I say this in all friendliness, and only with the desire to be of help. One is that with a very natural wish to nationalise the timber industry in Burma as rapidly as possible, the new, and as they themselves will admit, inexperienced Government will attempt to move too rapidly towards the fulfilment of their desire. I have already mentioned the depletion of staff from which they necessarily suffer. In addition they have not the capital, the country is poor, with, as I say, an enormous problem of reconstruction, having been fought over in two directions. They have not the capital, and it was estimated that something like £10,000,000 was locked up in the teak industry. Nor have they the experience of the administration of big business, and I beg them not to attempt to move too fast towards the ejection of European firms that have in the past worked their forests for them so efficiently and profitably.

The other danger I see is this. All Governments, even the most enlightened, are notoriously short-sighted in regard to forest finances, and I think there is some danger that an inexperienced Burmese Government may, as so many countries have in the past, look upon their forests as an inexhaustible asset, and bring pressure to bear on the department, pressure the department will find difficulty in resisting, to produce too many golden eggs, with the fate that has overcome the forests in Siam, where there is now no teak over four- or five-foot girth, not enough to make it worth the while of a reputable extraction agency to work it. There may be pressure brought on the department in Burma to over-fell, which would result in Burma's forests going the same way. Let us hope that they will have the strength and understanding to resist this temptation.

DISCUSSION

THE CHAIRMAN: Ladies and Gentlemen, we have listened to a most interesting and instructive lecture by Mr. Atkinson, as was to be expected seeing that Mr. Atkinson has spent twenty-five years in the Burma Forest Service, rising eventually to be Chief Conservator of Forests after the re-occupation of Burma when the Japanese left. He spent most of his time in the lecture on interesting photographs and explanations of teak extraction, and he did not give very much time to the actual work that is carried out by the officers of his own department, though just at the end he did mention it. As an officer of another department in Burma for many years, I think it might not be out of place to mention, and to emphasise the excellent work that was done by the Forest Department, and the difficulties that a department of that kind has had to face. Mr. Atkinson has spoken about the possibility of the Government of Burma in the future wasting its forest assets. That was one of the very great dangers that the Forest Department in Burma had to guard against latterly. When a Burmese Minister had taken charge

of the Forest Department there always was a considerable amount of pressure on him from local people to obtain revenue-free extraction licenses to a greater extent than the department considered justified—looking forward to the future continuance of the industry as a permanent source of wealth for the country. The Forest Minister was also frequently pestered with applications from all parts of the country for the transfer of extraction leases to Burmese firms instead of to the experienced European firms. That was one of the great difficulties that the Forest Department had to stand up against, and I am afraid, as Mr. Atkinson says, it may be one of the main stumbling blocks of the new Burmese Government which has just taken over. We may, however, wish the new Government all success in its difficult task.

I think all I need to say further is to express to Mr. Atkinson, on behalf of all of us, our gratitude for the time and trouble he has taken in preparing this extremely interesting lecture on the forests of Burma.

The vote of thanks was carried with acclamation, and the meeting then terminated.

R.D.I. VISIT TO SWEDEN

Our party consisted of the Master of the Faculty, Mr. Gordon Russell and the following other R.D.I.s: Messrs. Percy Smith, Ashley Havinden, A. B. Read, James Gardner and Milner Gray. Dr. R. S. Edwards, as Chairman of the Council of Industrial Design, and Mr. K. W. Luckhurst, Secretary of the Royal Society of Arts, were also members of the party.

We left Tilbury in the S.S. *Britannia* on Saturday, June 6th, and arrived in Gothenburg early on June 8th where we were met by Dr. Anjou of the Museum there. Mr. Åke Huldt, Principal of the Sloyd Föreningen School, met us at the Museum and we inspected the exhibition arranged for the school centenary celebrations. Visits were also paid to the Town Hall with its additions by Gunnar Asplund, the Concert Hall and the Borsen, which has some most attractive Victorian decorations.

We left Gothenburg that evening and after an eight hours' journey, broken for a few hours' sleep at Nassjö, we reached Orrefors the next morning at about 10 a.m. We were met at the station by Mr. Edward Hald, HON.R.D.I., who took us at once to Mr. Guy Robert's house. Here a delightful informal meal had been prepared, after which on a perfect day, in the beautiful garden of the house set in a rich valley with a small stream winding through it, I presented his R.D.I. diploma to Mr. Edward Hald. The honorary distinction had been conferred on him in 1939 but owing to the war and, since the war, to Mr. Hald's illness it had not been possible for the diploma to be presented to him in London. We then visited the well-known glassworks, and members of the party were able to talk to the designers and others connected with the factory. Of special interest were the experimental pieces being produced for an exhibition later in the year to celebrate the fiftieth anniversary of the founding of the industry at Orrefors. After a visit to Mr. Hald's house we left for Stockholm—another eight hours' journey—where we were met by Dr. Skawonius, Director of Svenska Sloyd Föreningen, a body similar to the Council of Industrial Design, who had been responsible for planning our tour.

Early the next morning a visit was paid to Gunnar Asplund's remarkable crematorium. There the party was joined by Professor Eskil Sundahl, chief architect of the Swedish Co-operative Society, and visits were paid with him to co-operative

shops both in the town and country. The high standard of these was noted, and the self-service arrangements at one of the shops were of special interest. Professor Sundahl then took us to his own offices in the Co-operative headquarters in Katerinavägan and lunch was served specially on the roof garden above them, which was most skilfully planted in an informal way quite new to me. After lunch the party visited the Luma electric light bulb works and then, at a press conference at S. S. F. headquarters, I was able to explain the reason for our visit and say something of the forthcoming R.D.I. exhibition at the Royal Academy, to be staged jointly by the Royal Society of Arts and the Council of Industrial Design. In the evening a dinner was given to us by S. S. F. in the Mosebacke restaurant overlooking Stockholm and we were able to meet a number of distinguished people. I was particularly delighted to see Professor Gregor Paulsson, Professor Carl Malmsten, Dr. and Mrs. Stavenow, Dr. and Mrs. Skawonius, Mr. Elias Svedberg, Miss Eva Benedicks, Mr. Arthur Hald, Baron and Baroness Fleming, Professor Eskil Sundahl and Mr. Tom Björklund among others.

The next morning, after finding ourselves front page news, we set out for the new shop called NK BO which has been specially planned by the big store Nordiska Kompaniet to show furniture and home equipment of good modern design, and nothing else, with sales staff specially trained to advise on it and sell it. We were particularly interested by the series of courses planned for customers at the shop, to teach them more about the goods they would need to buy when setting up house. This looked a most promising development and showed a sense of responsibility on the part of the shop which deserves encouragement. Mr. Tom Björklund, and Mr. Svedberg, designer of the N. K. Package furniture, gave us lunch in the excellent NK restaurant, where the large table with its flags caused quite a stir after the Stockholm morning papers' efforts. In the afternoon we visited the Nordiska Museum and were most attracted by the rearrangements recently carried out by Mr. Svedberg. Some of us also visited the Historical Museum next day where even more impressive work is being done by the same designer. Then we went round the Svenska Tenn shop.

Next day we were free to visit various shops, the Town Hall, the open-air museum of Skansen, etc., and in the evening we gave a dinner to the S. S. F. at the old restaurant of Djurgårdsbrunn.

On Saturday, escorted by Mr. Thunström, we visited the Co-operative flour mills at Kvarnholmen and the famous pottery works, now owned by the Co-operative, at Gustavsberg. The designers at the latter, Mr. Wilhelm Kage and Mr. Stig Lindberg, took us round and we were specially pleased to see the relation of the small handwork section for individual pieces to the mass-production factory. After lunch at an old farmhouse most attractively adapted as a youth hostel we inspected a number of houses on the Co-operative estate. This was a rewarding experience. Some of these homes had only one bedroom, but all had large basements. Spotless cleanliness and the habit of growing plants indoors seem to be universal: the adoption of a high standard of design is not. A three hours' motor-boat trip in the Archipelago completed a most interesting day.

On Sunday we were asked to lunch with Professor and Mrs. Paulsson at their charming home at Uppsala where he has the Chair of Fine Arts. He was for some

years Director of S. S. F. and is now its Chairman. It was a most pleasant surprise to find that Mr. and Mrs. Alvar Aalto, the well-known Finnish architect and furniture designer, who was appointed Hon.R.D.I. last year, were joining us for lunch. We then visited the cathedral and walked around the town. In the evening, Dr. and Mrs. Skawonius gave us a farewell dinner in their flat, after which Professor Carl Malmsten showed some of the party round his shop till 1 a.m.

We are especially indebted to Dr. Skawonius and Mr. Euren for organising the programme for us in Sweden and to the Royal Society of Arts for allowing Mr. Luckhurst to join us. He had made all the arrangements our end and it was largely owing to his careful preparation that there were no hitches of any kind.

I think everyone who went will agree that the stimulation provided by such a visit is most important at this time. The discussions between members of the party and also with our opposite numbers in Sweden will provide food for thought for a long time. It is also a good thing to let another country know that we have designers in Britain—sometimes they overlook the fact! And we must remember that no country has solved this design problem, so by publicising design in Sweden we have helped the S. S. F. Besides, such an effort as this does have repercussions at home. Business men visiting Sweden may be astonished to find that some of our designers are well-known there.

It was a memorable visit and no doubt we shall make up for lack of sleep in time!

GORDON RUSSELL.

OBITUARY

EDWARD HARPUR FRYER.—We regret to announce the death of June 20th of Mr. E. H. Fryer who had been a Fellow of the Society since 1943.

Fryer was born in 1879 at Derby and after a few years' practise as an architect and surveyor, he took a temporary paid position with the Motor Union in 1910. This amalgamated soon afterwards with the Automobile Association and, except for four years war service with the Royal Engineers in the Great War, he remained with the Automobile Association until now, becoming Deputy Secretary in 1919, and Secretary in 1942.

GENERAL NOTES

DR. JOHNSON'S HOUSE.—All who are acquainted with the history of the Society will be familiar with Dr. Johnson's association with it in its early days. His distinctive signature is preserved in the Society's records—where it was recently examined by our Royal President—and Boswell recalls his speech before the Society "upon a subject relative to mechanics" which, though it appears to have been the only address Johnson delivered in public and afforded him much misgiving, "excited general admiration".

It is therefore fitting that this *Journal* should be among the first to welcome the reopening (after an interval of nearly ten years) of his old home in Gough Square, a few steps to the north of Fleet Street. Despite serious bomb damage, particularly to the attic where the Dictionary was compiled by a band of assistants, the house has been so well repaired that it appears hardly changed since the days when Hanslip Fletcher and E. H. New made drawings of the mellow brick front.

Inside, such changes as have taken place enhance the interest and value of the collection. There are new additions to the pictures which present a little gallery of Johnson's intimate circle. Besides the Cham himself, there are studies of his negro servant, Francis Barber, and of Mrs. Anna Williams, the blind poetess whom he

befriended in Gough Square after the death of his wife, and whose tantrums he stoically endured. The shelves too are relined with choice editions of his works, which include a memorial volume containing a number of autograph letters and a white lock of his hair.

As one turns away from this monument to his genius and industry, the last sentence of Macaulay's essay springs to the mind: "The reputation of those writings, which he probably expected to be immortal, is every day fading; while those peculiarities of manner and that careless table-talk, the memory of which he probably thought would die with him, are likely to be remembered as long as the English language is spoken in any quarter of the globe".

N. A. D. W.

EXHIBITION OF PICTURES FOR SCHOOLS, *Organised by the Society for Education in Art with the support of the Arts Council. Tate Gallery June 18th to July 8th.*—The principle behind this exhibition is more important than the title might suggest. It is, I believe, the necessity of entirely making over the physical environment of the children in our schools to one of visual decency. What an enormous task this is, and how necessary. The nineteenth-century legacy of schools is for the most part an appalling one, varying from locality to locality from the frankly wretched to the merely tolerable. The primary schools, as they are now called, are of course the worst offenders, and just because they are the numerically greater, the more urgently in need of attention. Under present conditions millions of English children are subject, throughout their most impressionable years, to the influence, on the one hand of unæsthetic surroundings at home, and on the other to an ugly environment at school. We can see the results around us; a supreme national indifference to the arts, and a tolerance of bad building, unplanned towns and generally of a visual environment incomparably poorer than any produced hitherto by any other age. If this state of affairs is to be remedied, we must not only start from the top with the building of new schools and the rejuvenation of old, but from the bottom, by the education of our children to the appreciation of visual things.

This exhibition is at least an attempt to give a place to paintings, as distinct from reproductions, in our schools. As such it is a valuable step towards a wider consideration of the appearance of our schools, a subject which it is to be hoped the forward-looking Society for Education in Art will soon tackle.

There is no indication in this show of the age-groups for which these paintings are intended. This is an important point because children between the ages of say five and fifteen vary more in their tastes than adults between seventeen and seventy. For example, I consider that, for infants, the paintings of other infants are infinitely more suitable than anything the adult artist can devise for this age. Another question is to what extent children possess discrimination in the adult sense. Can they distinguish between a "good" picture and a "bad" one? My experience is that until adolescence is well advanced they cannot. But they do know whether a picture interests them or not, and their interest is largely stimulated by action and incident—in other words by the "literary" elements which so many modern painters have been at pains to eliminate from their work. In fact I suspect that the Royal Academy picture-of-the-year would find more childish supporters than many of the paintings now shown in the basement of the Tate. Nevertheless, what is needed is painting which, while full of anecdote and incident, is good æsthetically, and the Tate exhibition does go a long way towards providing this sort of picture.

It is to be hoped that education authorities will begin now to form collections of modern paintings from this and similar exhibitions. If they do, perhaps more painters will turn their eyes from inside themselves or their studios, to a contemplation of the outside world, with who knows what consequences for English painting?

LEONARD GREAVES.



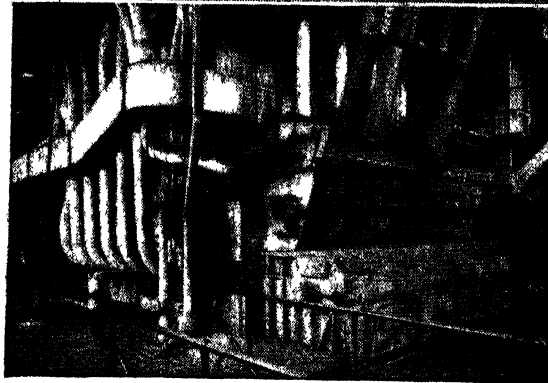
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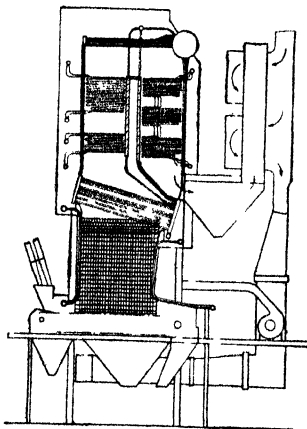


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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4773

FRIDAY, JULY 16th, 1948

Vol. xcvi

PRESENTATION OF ALBERT MEDAL

On Thursday, 1st July, Her Royal Highness The Princess Elizabeth presented to Sir William Reid Dick, K.C.V.O., R.A., at Buckingham Palace, the Society's Gold Medal, which had been awarded to him "for National Memories in Living Stone". Members of Council present were: Professor E. N. da C. Andrade; Mr. F. H. Andrews; Mr. A. C. Bosson; Sir Frank H. Brown; Major W. H. Cadman; Sir Edward Crowe; Professor E. C. Dodds; Sir Thomas Dunlop; Mr. E. W. Goodale; Dame Caroline Haslett; Sir Harry Lindsay; Sir Henry McMahon; Mr. F. A. Mercer; Mr. J. A. Milne; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. William Will; Mr. J. G. Wilson, and Miss Anna Zinkeisen: with Mr. K. W. Luckhurst (Secretary).

Lady Reid Dick and Lady Lindsay were also present.

The President, in presenting the Albert Medal to Sir William Reid Dick, said:

"Sir William Reid Dick, on the recommendation of the Council of the Royal Society of Arts, and also on my own behalf as President of the Society, I have much pleasure in presenting to you the Albert Medal of the Society.

"The high qualities of your work as a sculptor have won for you a great reputation not only in the United Kingdom but also in the Overseas Empire, on the Continent and in the United States. The first World War, in which you saw active service, gave you the inspiration for more than one of our great national memorials. In more recent days your statues of my grandfather, King George V, and of President Roosevelt have been widely acclaimed for their artistic merit and have brought you still further well deserved distinction both at home and abroad.

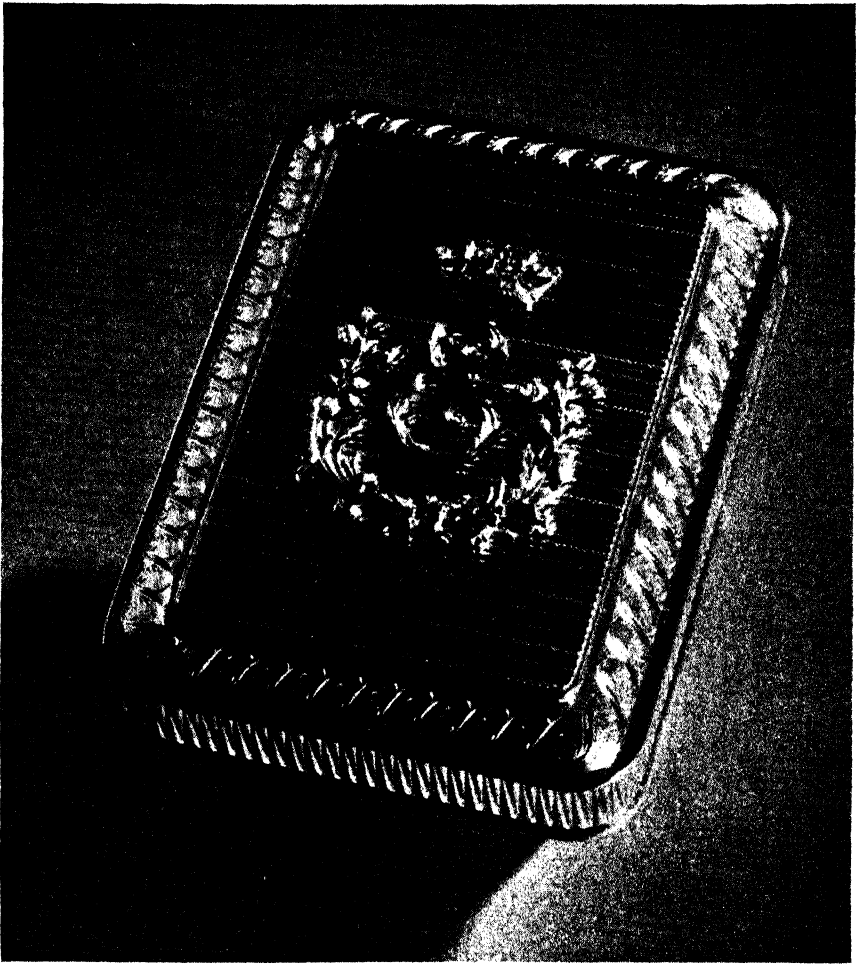
"As you know, this medal commemorates the period of nineteen years during which my great-great-grandfather, the Prince Consort, presided over the Royal Society of Arts. On the rim of the medal you will find the legend 'For National Memories in Living Stone'. Your skill has helped us to keep those memories fresh and fair, and for this your countrymen are greatly in your debt."

Sir William Reid Dick replied:

"Your Royal Highness, I am very grateful to the Royal Society of Arts, whose President you are, for awarding me this medal, and to you, Your Royal Highness, for presenting it to me in person. Your great-great-grandfather, Prince Albert, was a noble friend of both art and science, and I am proud to possess a symbol of approbation that commemorates his name. It has been my happy privilege to receive many favours from your Royal House, and your gracious words to-day add to my obligations. I offer my humble thanks to you as our Royal Princess and also as representative of the Society that has done me so much honour."

*PRESENTATION OF THE SOCIETY'S WEDDING GIFT TO
THE PRESIDENT*

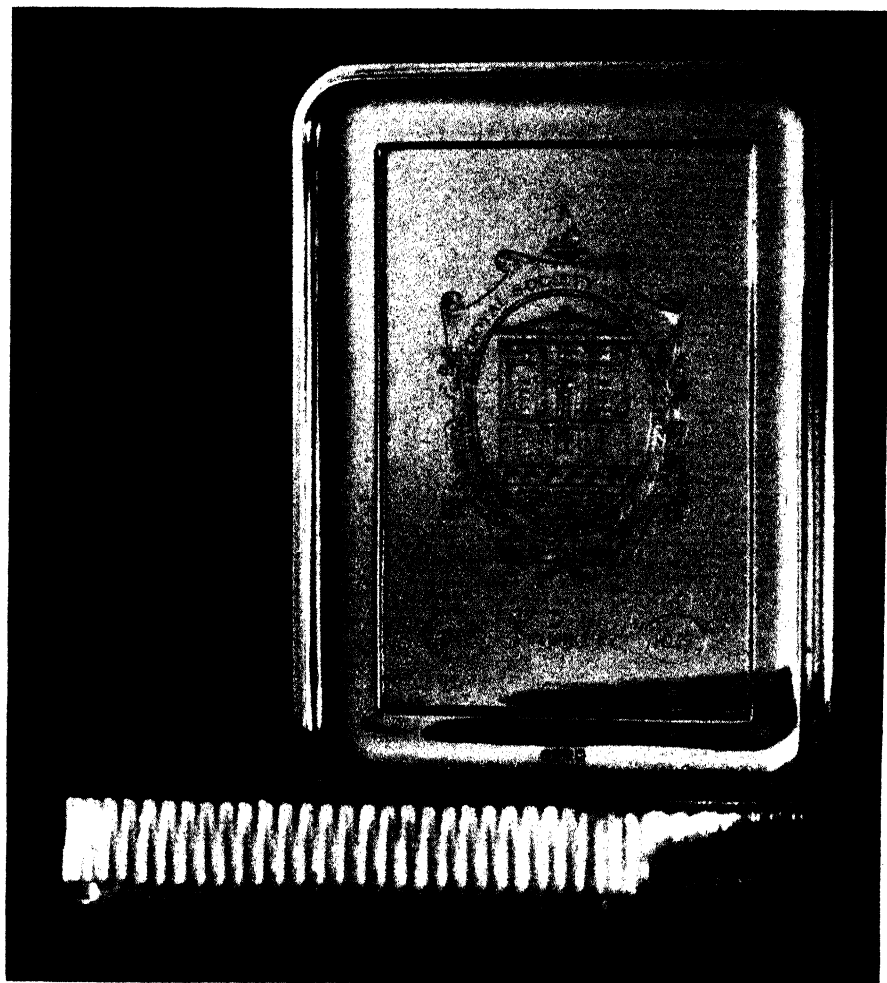
Before the ceremony of the presentation of the Albert Medal at Buckingham Palace, the Chairman of Council, Sir Harry Lindsay, took the opportunity to give Her Royal Highness the Society's wedding gift to her, which had just been



The gold box photographed from above. The transverse lines are in white and yellow gold, the garland in red and green gold and the cypher and coronet are in yellow gold

completed. This, as announced on p. 16 of this volume of the *Journal*, takes the form of a small gold box, which was designed by Mr. Robert Goodden, R.D.I., and has been executed by Messrs. Asprey & Co., Ltd.

The box has taken six months to manufacture, the carving, engraving and inlaying calling for the highest skill, and four craftsmen have been engaged on the work. It weighs $7\frac{1}{2}$ oz., and measures $3\frac{1}{2}$ ins. x $2\frac{3}{4}$ ins. x $\frac{3}{4}$ in. The box itself and the cypher and coronet, which are encrusted on it, are of yellow gold, the lid is inlaid with



The inner face of the lid of the box, showing the engraved emblem of the Society

bands of white gold and the surrounding garland, which is made up of the four national emblems, is in green and red gold.

In addition to the Council, Mr. Robert Goodden, the designer, Mr. William Hornby, one of the goldsmiths who worked the box, and the engraver, Mr. Theodore Wyse, also attended the ceremony and were presented to Her Royal Highness.

After the presentation of the wedding gift Her Royal Highness was graciously pleased to send a letter to Sir Harry Lindsay, Chairman of Council, thanking the Members of the Society, through him, for their present to her. The letter is reproduced below.



BUCKINGHAM PALACE

6th July, 1948.

Dear Sir Harry,

I am so grateful to the Royal Society of Arts for the magnificent gold box which they have given me as a Wedding Present. It is an object of great beauty, the design of which I particularly admire.

I send you and the Members of the Society my warmest thanks for a really delightful present which I shall always treasure.

Yours sincerely,

A handwritten signature in cursive script, reading "Elizabeth", with a horizontal line underneath.

WAR MEMORIALS ADVISORY COUNCIL

The following letter, addressed to the Editor, appeared in *The Times*, on July 6th, 1948:

A NATIONAL WAR MEMORIAL

Sir,

Three years have elapsed since the end of the War, and public opinion has not yet manifested itself on the question of some visible commemoration at the heart of the Empire of the great national War effort.

In a debate in the House of Lords on January 22nd, 1947, the President of this Council expressed the following view, which you, Sir, subsequently supported in a leading article:

"We do not believe that the country as a whole will feel that the re-dedication of our beautiful Cenotaph is enough to convey to posterity the immensity of our national effort or the high ideals that lay behind it It is not alone the glorious dead of the fighting forces we must commemorate; we must remember all who died in the struggle—the men and women who fought the bombs and fires, our merchant seamen who kept the seas, those who died exhausted from war work, and thousands of others whose work is unrecorded and cannot be practically recognised. Nor is it the dead alone, but the living, whose faith and efforts should be perpetuated in the nation's memory. . . . But above all, it is the spirit in which we fought which we should primarily commemorate—the high ideals that inspired us"

Lord Hall, on behalf of the Government, made a somewhat discouraging reply, saying that no scheme had yet been brought forward which commanded the necessary public support.

On October 1st, last, the Prime Minister was good enough to receive the signatories of this letter as a Deputation. We urged that unless the Government expressed agreement in principle with the idea of a national war memorial and indicated a suitable site, it could scarcely be expected that architects and sculptors would submit suggestions. We asked that a committee should be set up under Government auspices to prepare one or more schemes for submission to the public for which subscriptions might be invited.

The Prime Minister subsequently wrote to us as follows:

"We are all anxious that this country should cherish the ideals for which the late war was fought, and bear in mind the sacrifices made by those who suffered in the course of it. Whether expression should be given in physical form to those aspirations and memories is a question of great difficulty, and my colleagues and I, after giving the matter much thought, feel that the course of action which you proposed is not desirable in present circumstances".

The War Memorials Advisory Council feels that it should not allow the matter to rest there. We call attention to two proposals, either of which we believe would command widespread public approval:

(1) To improve and beautify the precincts of Westminster Abbey. The late Sir Herbert Baker, amongst others, drew up plans for the remodelling of Parliament Square to provide a worthier foreground to the Abbey, which could readily incorporate memorial features.

(2) The blitzed areas round St. Paul's provide another excellent site. Here a memorial garden with a symbol of the great National, and indeed Imperial, effort might well be included in plans for the reconstruction of this site.

At the moment, however, Sir, our concern is not with any particular scheme, but to ask the British public, through your columns, whether its efforts in a great cause should not have a visible commemoration that would both acknowledge our gratitude to the fallen and place on record, for the inspiration of posterity, that through six testing years the spirit of this nation did not fail.

We are, Sir,

Yours faithfully,

CHATFIELD, *Admiral of the Fleet (President)*,

MARGARET G. BONDFIELD,

HARRY A. F. LINDSAY,

J. A. MILNE,

HAROLD NICOLSON.

THE LIBRARY

After its enforced closing during the War, and the recent long period of re-organisation, the Council are happy to announce that the Library is once again open. The following notes are therefore written with the intention of encouraging its use by Fellows of the Society and to interest them in one side of the Society's activities which has not hitherto been fully developed.

The policy which was decided upon some months ago by the Council and which is now being put into operation takes into account the fact that the interests of the Society cover an immensely wide field. It is therefore obviously impossible to try to provide books and material on all these subjects, most of which are far better covered by larger and more specialised libraries elsewhere. It has been decided accordingly that the Library should mainly serve general reference purposes and be a jumping-off ground for more intensive studies, the material for which must of necessity be found in other specialist libraries. To achieve this aim a small but up-to-date reference section is being collected together which will contain standard reference books of a general nature and others on the specific arts and sciences. The Society also receives over 200 current periodicals covering a wide range of subjects, and the Library possesses a good collection of transactions and journals of other societies, which form most valuable sources of information. In addition the Librarian is available to assist in guiding members to any information which they require either in or outside the Library.

Another section of the Library is formed by a special collection of material on exhibitions and the histories of the Royal Society of Arts and other kindred societies. This section is still in its infancy, but as the Society has done so much in the past to promote exhibitions of many kinds, a collection of works on this subject, which is not available elsewhere, is peculiarly appropriate to this Library.

There is also a small collection of books of general interest which may be borrowed either by a personal visit or through the post. This small lending library is intended merely as an adjunct to the main portion of the Library which is for more serious

reference work, and does not attempt to satisfy the complete reading wants of our members.

The last section requiring mention is that which is formed by works printed prior to 1830, including books on agriculture, navigation, commerce, science and India. Many of these are unfortunately in a poor condition at present but they will be put in good repair as circumstances allow.

It is hoped that members will make full use of the books and material now available. In so doing they will help the Library Committee to assess the demand which is likely to be made on the Library resources and thus guide them in developing their policy.

PROCEEDINGS OF THE SOCIETY

ONE-HUNDRED-AND-NINETY-FOURTH ANNUAL GENERAL MEETING

WEDNESDAY, JUNE 30TH, 1948

SIR HARRY LINDSAY, K.C.I.E., C.B.E., *in the Chair*

The One-Hundred-and-Ninety-Fourth Annual General Meeting, for the purpose of receiving the Council's Report and the Financial Statements for 1947, and for the election of officers, was held in accordance with the bye-laws, on Wednesday, June 30th, 1948, at 3 p.m., at the Society's House.

THE CHAIRMAN: Before we proceed to the more formal part of our Agenda to-day, I should like to say one or two things by way of introduction—to recall to you two memories, one grave and one gay. The grave memory, of course, is the fact that a year ago Lord Bennett presided at our last Annual General Meeting, and that only two days later he was no more. He was a very gallant and courteous President and Chairman, as good and kindly as he was efficient. He has left a very fine example to us all.

The gay memory is that, before he died, he had often expressed the hope that Her Royal Highness The Princess Elizabeth would become our President; and that wish has now been realised. I am sure that from the Elysian Fields Lord Bennett is looking down and taking pleasure that we now have a President who so very worthily maintains, in every way, the dignity and the prestige of our Royal Presidents of the past, from the Prince Consort onwards. Throughout the Annual Report which follows you will find, time and again, practical examples of the close interest which Her Royal Highness maintains in the affairs of the Society over which she so graciously presides.

THE SECRETARY read the Notice convening the meeting and proved that it had been duly exhibited and published as required by the Bye-Laws.

The Minutes of the last Annual General Meeting, held on June 25th, 1947, were read and were signed by the Chairman as a correct record.

THE CHAIRMAN then summarised the following Annual Report of the Council for the 194th Session:

ANNUAL REPORT OF THE COUNCIL

194th SESSION, 1947-48

I.—PRESIDENCY OF THE SOCIETY

At the Annual General Meeting on June 25th, 1947 (at which he presided) Viscount Bennett was re-elected President of the Society. Unhappily his third term of office proved tragically brief through his sudden death less than 48 hours after the meeting. An appreciation of the Society's profound loss through this sad event was recorded in the *Journal*, pp. 560-1.

At their first meeting the newly-elected Council unanimously decided to approach The Princess Elizabeth with an invitation to fill the vacancy thus created, and on receipt of a favourable reply Her Royal Highness was elected President at a special meeting of Council convened on August 19th, 1947. The new President honoured the Society by attending the Inaugural Meeting of the Session on November 5th. A full report of Her Royal Highness's visit is contained in the *Journal*, pp. 3-18.

II.—ALBERT MEDAL

With the approval of the President, the Council decided that the Albert Medal for 1948 be awarded to Sir William Reid Dick, K.C.V.O., R.A., for "national memories in living stone".

III.—ROYAL DESIGNERS FOR INDUSTRY ("R.D.I.")

The Council has this year made one new appointment to the Distinction, viz.:—
Christian Barman (Design for Transport).

During the year the Faculty of Royal Designers for Industry has in several notable ways further established its position as an association of leading British designers. In September a party of members, accompanied by Sir Harry Lindsay, who as Chairman of Council of the Society is *ex officio* President of the Faculty, and by the Secretary, paid an official visit to the "Enterprise Scotland 1947" Exhibition in Edinburgh, and thereafter toured a variety of industries in Central Scotland. The success of this visit led to a similar tour being arranged to Sweden during June, 1948. For this latter visit the party was inevitably smaller, but was accompanied by Dr. Edwards, Chairman of the Council of Industrial Design. The Secretary also was with the party as the representative of the parent Society.

Another activity which is extending the influence of the Faculty is a monthly reunion at which leading members of other bodies concerned with design, and individual designers, are invited to meet members of the Faculty.

Most important of all, it has now been definitely decided to organise an exhibition of works of R.D.I.'s. and the exhibition is being supported not only by the Royal Society of Arts but also by the Council of Industrial Design. Mr. Milner Gray, R.D.I., has been appointed Designer-in-charge and the exhibition will be held at Burlington House (by consent of the President and Council of the Royal Academy) in October and November.

The Faculty has suffered the loss of another of its original members, Mr. James H. Hogan, who was Master of the Faculty from 1941 to 1943.

IV.—FINANCE

In spite of considerable expenditure in connection with post-war reconstruction and development the Accounts again show an excess of income over expenditure. The costs of administration and of the various functions of the Society, however, continue to increase, and the financial position should not be regarded with undue optimism.

V.—THE SOCIETY'S HOUSE

During the year those sections of the Society's buildings which have been out of commission since the air raid of May 18th, 1941, have been thoroughly repaired and restored to use.

Work in the Lecture Hall, under the direction of the Society's Architect, Mr. O. P. Milne, F.R.I.B.A., was completed in the Autumn and the room was reopened by the President when Her Royal Highness attended the Inaugural Meeting on November 5th. The lecture and demonstration apparatus has also been brought up to date and a sound-and-silent cinematograph projector substituted for a silent one.

A number of small rooms on the top floor have also been reconditioned; some of them are in use once again for storage purposes and others have been temporarily leased for use by the organisers of "The Festival of Britain, 1951".

The Library, which during most of the war years proved invaluable, in spite of its many scars, as a temporary lecture hall, has also been repaired and made available for its proper use.

Although, therefore, marks of air raid damage are still to be seen in some parts of the building, the whole of it is once more in use and much of it has fully regained its beauty.

VI.—"THE FESTIVAL OF BRITAIN, 1951"

Contact has been maintained with the Government on the question of the celebration of the centenary of the 1851 Exhibition; and when, in March, an official organisation was set up, with Lord Ismay as Chairman of Council and Mr. Gerald Barry as Director-General, to make preparation for the centenary, the Society was invited, in order to establish for the new project an association with the building in which the 1851 Exhibition had been initially planned, to provide accommodation for part of the staff of the Executive. To this the Council readily agreed and the official address of The Festival is therefore the Society's House and its first Council meeting was held there. At this meeting, on May 31st, The Princess Elizabeth attended in her capacity as President of the Society to welcome the members of the Council, thereby re-enacting the role played by the Prince Consort who as President of the Society of Arts became President of the Royal Commission for the 1851 Exhibition. A report of the proceedings of this meeting has been published in the *Journal*, p. 427. The Society is represented by Sir Harry Lindsay, Chairman of Council, upon the Council of The Festival and by Sir Frank Smith, upon the special Council for the Exhibition of Science and Technology. *Per contra*, Mr. Gerald Barry has agreed to serve on the Council of this Society; his name will come up later in these proceedings for election. The connection between the two Councils will thus be close.

VII.—EXAMINATIONS

The figures given below show that the past year has been one of exceptional progress by the Examinations Department. The total number of entries received to date for the Society's examinations to be held during the session 1947-48 (from November, 1947 to July, 1948) is 128,579, being an increase of 40,587 on the figures for the examinations in 1946-47.

This total was made up of entries for the various series as follows:

	1947-8	1946-7
(a) Ordinary examinations (includes approximately 8,000 Civil Service candidates entered at Autumn series, 1947)	88,027	73,400
(b) London County Council Grouped Course	4,375	3,053
Home Counties Grouped Course	2,952	2,703
(c) Examinations for employees of Road Transport Undertakings:		
Scheme "A"	290	347
Scheme "B"	1,830	1,017
(d) School Commercial Certificate (March and July)	6,915	6,046
Senior School Commercial Certificate (July)... ..	755	856
(e) English for Dutch Students in Holland	55	117
(f) Civil Service Proficiency Tests (March)	8,350	—
(g) Ministry of Supply (Examination for Establishment of Temporary Clerks)	14,400	—
(h) British European Airways (Examinations in European Languages)	80	—
(i) Polish School of Foreign Trade (Book-keeping and Marine Insurance	60	—
(j) Oral examinations	490	453

In September, 1947, the Society was asked by H.M. Treasury to resume the conduct of the Proficiency Tests in Shorthand and Typewriting for Civil Service personnel. As there was then little time to arrange for these candidates to be examined at the Autumn Series, the co-operation of Local Education Authorities throughout the country was invoked, and their ready response enabled the examinations to be held at the Society's local centres in November. In March last, however, Proficiency Tests were held on the premises of the Government Departments concerned, under the arrangements existing during the war years, and this procedure will be followed at future examinations which will be held twice yearly.

Later in the autumn the Ministry of Supply sought the services of the Society in connection with their examination for Establishment of Temporary Clerks. Tests in Arithmetic, Current Affairs and English were arranged and have since been carried out. Requests from the British European Airways and the Polish School of Foreign Trade for the arrangement of various examinations were also met by the Society.

The Society has also been approached by the Foreign Office with a view to its providing written and oral examinations in German for members of the Control Commission staff in Germany, and it is anticipated that the first of these tests will be held in November next.

At the request of the London County Council a new examination in English for Foreigners will be held at the Autumn Series, 1948, and subsequently.

The various changes made in the time-tables, to which reference was made last year, have been fully justified by the entries received for the respective examinations.

A record number of committee meetings has been held during the year, and the Society is indebted to the chairmen and members of the various sub-committees for the time they have so freely and usefully given. The meetings have been largely concerned with the Examination for a Shorthand Teacher's Certificate which will be instituted in the Spring of 1949, and with the revision of syllabuses of the Senior School and School Commercial Certificate, and the London County Council Grouped Course examinations.

In order to cope with the expansion of activities during the year long hours of overtime have been worked by the staff.

A full report of the Society's examinations during the past year, giving detailed statistics and a summary of the examiners' reports on the papers worked in the various subjects, will be published in the *Journal* in the Autumn.

The Clothworkers' Company have generously continued their gift of money towards the cost of Savings Certificates which, during the war years and until now, have taken the place of silver and bronze medals awarded to the most successful candidates in the single-subject series of examinations.

VIII.—INDUSTRIAL ART BURSARIES

The Council continued in 1947 its annual offer of Bursaries to young British students taking up industrial design as a career. One Bursary, of £150 in value, was offered in each of the following industries: Furnishing Textiles, Wallpaper, Open-close Stoves and Leather Goods, and a Bursary awarded in the three first-named. A full report of the Competition was printed in the *Journal* for February 27th (pp. 193-9), with illustrations of the work of the successful candidates.

Several successful candidates of previous Competitions have travelled abroad during the past year, and four of them gave an account of their tours at a meeting of the Society on Wednesday, February 18th. These travel reports were published in the *Journal* for April 23rd (pp. 310-27).

The Industrial Art Bursaries Board was itself reconstituted by the Council at their meeting in March and is now under the Chairmanship of Mr. E. W. Goodale. Details of the reorganisation were given in the *Journal* for March 26th (pp. 242-3).

This year the Council is offering Travelling Scholarships to the total value of £900, of which £730 has been subscribed by the respective industries, to candidates in the following subjects: Carpets, Dress Textiles, Footwear, Furnishing Textiles, Leather Goods and Solid Fuel-burning appliances. Details of the Competition were given in the *Journal* for May 21st (p. 356).

IX.—LIBRARY

During the war years the Council initiated plans to reorganise the Library and to increase its usefulness to members of the Society. As soon as the Library became freed last autumn from its use as a temporary lecture hall, definite steps were taken to implement these plans. The room was thoroughly repaired and put in order, and a Librarian, Mr. K. D. C. Vernon, F.L.A., was appointed to take charge. The

work of thoroughly overhauling the entire stock of books has been in progress for some time. Particularly after the upheaval due to the War this has proved a long and arduous task but it is hoped that the Library will have reached a usable condition very shortly.

The supervision of the general policy of development of the Library is the responsibility of a special Committee presided over by Professor E. C. Dodds.

X.—THOMAS GRAY MEMORIAL TRUST

The objects of this Trust, which was founded in 1924, are: "The advancement of the science of navigation and the scientific and educational interests of the British Mercantile Marine".

In February, Captain A. H. Ryley, who had since 1939 given very valuable service to the Society as Chairman of this Committee, resigned owing to ill-health and his place has been taken by Captain L. G. Garbett, C.B.E., R.N. (retd.).

The following are the prizes offered and awards made under the Trust during the year:

(a) AWARD FOR DEED OF PROFESSIONAL MERIT

Two entries were received, but the Judges were unable to recommend an award.

(b) PRIZE FOR AN INVENTION

Six entries were received, but the Judges were unable to recommend an award for any of them.

(c) SCHOLARSHIPS FOR DECK BOYS AND YOUNG SEAMEN

During the year 1947 eleven candidates applied for these scholarships, which are administered by the Seafarers' Education Service, and seven scholarships were awarded. This compares with five awarded in the previous year.

A number of gratifying successes by students, who have taken the correspondence courses provided by these scholarships and conducted by University College, Southampton, have been reported.

(d) PRIZES FOR SHIPS' APPRENTICES

Fifteen prizes have been awarded, as in previous years, in connection with the examinations of the Merchant Navy Training Board. Five prizes are awarded in each year of seniority. Three candidates received sextants, two received binoculars, six received telescopes and four received parallel rulers. The number of apprentices and cadets coming within the scope of these examinations was 2,800.

(e) PRIZES FOR NAUTICAL COURSES

The annual examination for prizes for Junior Nautical Courses and Cadet Courses was held on June 12th at three schools. A report on this was given on p. 459 of the *Journal*.

(f) PRIZES TO TRAINING SHIPS

The Council again granted a prize of £5 each to the training ships *Indefatigable* and *Arethusa* for the boy in each ship who, in the opinion of the masters and staff, possessed the qualities which will make the finest sailor.

(g) THOMAS GRAY SILVER MEDAL

The award of a silver medal to the candidate obtaining the highest marks in the examinations for the Ministry of Transport Extra Master Certificate has been made to Captain F. G. Merrifield of Cardiff.

XI.—COLOMBO CATHEDRAL COMPETITION

An exhibition of prize-winning and other designs submitted in this competition, the result of which was reported in the last Annual Report, was held in the Society's Library last summer from August 25th to 30th, and considerable public interest was aroused by reports in the daily and technical press.

XII.—WAR MEMORIALS ADVISORY COUNCIL

Although it is now three years since the War in Europe ended, there is still much to be done throughout the country in commemorating those who gave their lives in that great conflict. Many schemes which local authorities have adopted cannot yet be carried out owing to building restrictions or to lack of funds, and as time goes on interest in the erection of War Memorials unfortunately tends to recede into the background, giving place to the more pressing needs of present-day problems. This, of course, can be understood in view of grave economic difficulties and the unsettled international situation, but it is felt that, if the dead of the last War are commemorated in town and country by visible means worthy of the cause for which they gave their lives, the nation as a whole will recall more easily and more permanently the tragic costliness of war and will strive with greater energy to help to lay the foundations of a lasting peace throughout the world.

With this object in view, and particularly to perpetuate the cause for which the last War was fought and the spirit of those in this country and in the Empire who died doing their duty, the War Memorials Advisory Council has persistently urged that a national, or Imperial, war memorial should find a place in London. Its efforts unfortunately have so far not met with success, but in spite of official refusal to approve such a scheme, the Council is still convinced that public feeling would support it if the nation could be apprised of its full significance. Every possible means is being sought to find a way to overcome the difficulties which at present stand in the way of the Council's aspirations.

In addition to this main preoccupation, the Council's advice has been freely given during the past year to many local authorities and other organisations who required guidance in connection with their war memorial schemes. Many of these are still in the early stages of planning, and the Advisory Council feels that by the services thus rendered it is continuing to perform a useful public function in the true tradition of the historical Society which sponsored it.

XIII.—NEW COUNCIL

The Vice-Presidents retiring under the Bye-Laws are Lord Amulree, Sir Edward Crowe, The Earl of Radnor and Mr. E. M. Rich. In addition, The Hon. Harold Nicolson and Mr. T. C. Dugdale have intimated their wish to retire. To fill these vacancies the Council recommend: Mr. F. H. Andrews, Mr. Gerald Barry, Sir Angus Gillan, Mr. Hugh Lyon, Mr. J. W. Ramsbottom and Sir John Woodhead.

The Ordinary Members retiring under the Bye-Laws are: Mr. F. H. Andrews, Sir William Halcrow, Mr. Basil Ionides and Mr. J. W. Ramsbottom and in their place the Council recommend: Mr. Peter Le Neve Foster, Mr. John Gloag, Mr. E. M. Rich and Mr. William Will.

Mr. William Will having completed the term of office as Treasurer permitted by the Bye-Laws, the Council recommend the election of Sir Edward Crowe to this office in his place.

XIV.—FELLOWSHIP

The number of Fellows on the roll is now 4,786 (including 38 Associates). This represents an increase of 391 in the total since the end of June last year and brings our strength to slightly above the total (4,650) at the outbreak of war. It is therefore a record figure and cause for great encouragement. Nevertheless the Council appeal to Fellows to continue their practical support of the Society by the introduction of new members.

A revised List of Fellows was published in July, 1947.

XV.—MEDALS FOR PAPERS

The Council approved the award of Silver Medals for seventeen papers read before the Society during the 193rd Session, details of which appeared in the *Journal* of August 1st (p. 591). Consideration is now being given to the award of Silver Medals for papers read during the 1947-48 Session.

The appearance of the Medals presented next autumn will be considerably changed, as the preparation of entirely new dies for the obverse and reverse of the medal is now well advanced. The President has graciously consented to the use of a representation of Her Royal Highness's head upon the obverse. It was felt advisable at the same time to redesign the reverse, the dies for which had become seriously worn, and to base this on the original design of Mr. F. H. Andrews, O.B.E., a Vice-President, which was subsequently adopted as the emblem of the Society. The work was entrusted to Mr. Percy Metcalfe, C.V.O., R.D.I. Plasters for obverse and reverse are now finished and have been approved by Her Royal Highness. The new dies are being made by Messrs. John Pinches & Son. A reproduction of the designs was published on p. 385 of the *Journal*.

XVI.—PAPERS AND LECTURES

[Page references to Journal reports are given in brackets]

A.—ORDINARY MEETINGS

There were twenty-three Ordinary Meetings during the Session. Following the tradition of recent years a proportion of Ordinary Meetings has been devoted to the consideration of a single subject, this year that of Craftsmanship. A total of ten meetings has been occupied with this special series which was opened by Mr. John Farleigh, Director of the newly-formed Crafts Centre of Great Britain. The economic importance at the present time of the preservation of traditional British Craftsmanship needs no stressing. This series has therefore concentrated rather on the cultural and æsthetic aspects of the subject. Other papers have covered a wide range of scientific and other topics. On most occasions a very satisfactory number has been present to hear and discuss the papers.

During the Session all meetings, except those for delivery of Cantor Lectures, have been at 2.30 p.m. Cantor Lectures have commenced at 4.30 p.m.

The full list of meetings is as follows:—

Chairman's Inaugural Address—*Sir Harry Lindsay*. (Pp. 6–15.)

Trueman Wood Lecture—

THE STRUCTURAL RELATIONSHIPS OF SOME PLANT PRODUCTS. *Sir Robert Robinson*.

Peter Le Neve Foster Lecture—

THE SPIRIT OF BRITISH CRAFTSMANSHIP. *Professor A. E. Richardson*.

Sir William Jackson Pope Memorial Lecture—

RECENT ADVANCES IN STEREOCHEMISTRY. *F. G. Mann*.

Selwyn Brinton Lecture—

ORIGINALITY IN ITALIAN RENAISSANCE ARCHITECTURE. *Professor R. A. Cordingley*. (Pp. 57–74.)

Special Series of Lectures on Craftsmanship—

(i) THE CRAFTS—THEIR PAST, PRESENT AND FUTURE. *John Farleigh*. (Pp. 28–37.)

(ii) THE CONTEMPORARY STUDIO-POTTER. *Bernard Leach*. (Pp. 356–372.)

(iii) THE CRAFTSMAN AND DESIGN IN THE TEXTILE INDUSTRY. *Alec B. Hunter*. (Pp. 224–236.)

(iv) CRAFTSMANSHIP AND LEATHER. *John W. Waterer*. (Pp. 245–260.)

(v) SMITHCRAFT. *J. Seymour Lindsay*. (Pp. 372–381.)

(vi) CODES OF WORK IN GLASS HISTORY. *W. A. Thorpe*.

(vii) CRAFTSMANSHIP IN FURNITURE—TRADITIONAL AND MODERN. *R. W. Symonds*.

(viii) CRAFTSMANSHIP IN THE COUNTRYSIDE. *Cosmo Clark*.

(ix) CRAFTSMANSHIP AND THE SPARE-TIME WORKER. *Miss Dorothy Allsopp and G. A. Stevens*.

[The Peter Le Neve Foster lecture constituted the tenth of this series.]

Other Papers—

THE DEVELOPMENT OF SOUND RECORDING AND REPRODUCTION. *Sir Ernest T. Fisk*. (Pp. 105–120.)

TOYNBEE HALL AND UNIVERSITY SETTLEMENTS. *Major Lionel F. Ellis*. (Pp. 167–178.)

RECENT PROGRESS IN THE MAKING OF PRECISION INSTRUMENTS. *A. J. Philpot*. (Pp. 213–224.)

EDUCATION FOR MANAGEMENT. *Lieut.-Colonel L. Urwick*. (Pp. 276–291.)

DESIGN IN SCANDINAVIA. *Harry Booth, Miss Winifred Ives, Leslie Morton and Miss Reeve Ronder*. (Pp. 310–327.)

THREE-DIMENSIONAL PHOTOGRAPHY. *C. Butement*. (Pp. 260–270.)

THE TRADE AND TECHNICAL PRESS. *Roland E. Dangerfield*. (Pp. 292–304.)

AFFORESTATION AS A WORLD PROBLEM. *Professor H. G. Champion*,

DISTRICT HEATING. *Henry S. Horsman*.

B.—INDIA, PAKISTAN AND BURMA SECTION

It was decided by the Council on January 12th, 1948, to change the name of the India and Burma Section of the Society to the India, Pakistan and Burma Section in view of the recent formation of the new Dominion of Pakistan.

Five meetings of the India, Pakistan and Burma Section were held, at which the following subjects were dealt with:

Sir George Birdwood Memorial Lecture—

THE GROWTH OF THE PRESS IN ENGLISH IN INDIA. *Sir Alfred H. Watson.*
(Pp. 121-130.)

Other Papers—

INDIAN ART—WITH SPECIAL REFERENCE TO THE EXHIBITION AT BURLINGTON HOUSE. *Basil Gray.* (Pp. 75-81.)

FORESTS AND FORESTRY IN BURMA. *D. J. Atkinson.*

THE BURMESE VIEWPOINT. *Rev. G. Appleton.*

THE HOUSE OF TATA—SIXTY YEARS' INDUSTRIAL DEVELOPMENT IN INDIA.
Sir Frederick James.

C.—DOMINIONS AND COLONIES SECTION

Six meetings of the Dominions and Colonies Section were held, as follows:—

Neil Matheson McWharrie Lecture—

SCIENTIFIC RESEARCH IN CANADA AND ITS LINKS WITH SCIENCE IN THE UNITED KINGDOM. *J. G. Malloch.* (Pp. 38-50.)

Other Papers—

AUSTRALIAN ART. *Colin Colahan.* (Pp. 87-97.)

RECONSTRUCTION IN MALAYA. *A. T. Newbould.* (Pp. 331-350.)

CO-ORDINATION OF RESEARCH IN THE PACIFIC. *E. Marsden.*

THE EAST AFRICAN GROUND-NUTS SCHEME. *A. J. Wakefield.*

CONTROL OF INSECT-BORNE DISEASES IN THE COLONIES; SOME RECENT PROGRESS AND FUTURE PROSPECTS. *C. B. Symes.*

D.—CANTOR LECTURES

The following Cantor Lectures were delivered:—

MODERN DANISH DESIGN. *Professor Steen Eiler Rasmussen.* (Pp. 138-145.)

THE EFFECT OF ADVERTISING ON COMMERCIAL DESIGN. *Ashley Havinden.*
(Pp. 145-157.)

EXHIBITION DISPLAY. *James Gardner.* (Pp. 158-165.)

THE COMMON COLD. *C. H. Andrewes.* (Pp. 200-210.)

THE METABOLISM OF FATS. *Professor A. C. Frazer.*

FATS IN THE LIFE OF THE NATION. *Sir Jack Drummond.*

COLLOIDS. *Professor Eric K. Rideal.* (Three Lectures.)

RECENT ADVANCES IN ANÆSTHESIA. *Frankis T. Evans.* (Three Lectures.)

E.—DR. MANN JUVENILE LECTURES

HOW WE GET OUR COAL. *F. J. North.* (Pp. 179-182.)

WHAT WE DO WITH OUR COAL. *W. Idris Jones.* (Pp. 182-184.)

XVII. BEQUESTS AND GIFTS

During the year the Society has received two important bequests. Viscount Bennett bequeathed a sum of £2,500, together with several articles of furniture and a number of bronzes. This was in addition to the gift of £1,500 made during his lifetime for the establishment of the R. B. Bennett Empire Prize. The Society

has also come into a position to receive the first instalment of the benefits to which it is entitled under the will of the late Mr. Henry Morley, a Fellow of the Society for over 60 years. The amount to be received at present is approximately £9,000.

XVIII.—OBITUARY

The Council record with regret the death of a number of Fellows during the past twelve months. Among them were: Viscount Bennett, who was President of the Society and Chairman of Council at the time of his death, and the following five former members of Council: The Rev. Ethelbert Goodchild; James H. Hogan; Lord Phillimore; Sir Reginald Stubbs and William James Uglow Woolcock.

Other Fellows who died during the year included the Earl of Derby, who was awarded the Society's Albert Medal in 1936; Samuel Courtauld; Rear-Admiral S. R. Dight; Sir Robert Graham; Sir Albert Howard; Steward Butler Hubbard; Oliver Lucas; Sir Alexander MacCormick; The Hon. Sir Homi Mehta; Sir John Perring; Sir Alfred Pickford; Victor Roy Smith, and Clyde Young.

XIX.—STAFF

The year has seen the departure, on retirement, of a very old servant of the Society, Mr. A. G. Toye, the Accountant, who joined the staff in 1900. Presentations were made to Mr. Toye by the Council and the staff. Mr. I. Purdam, A.S.A.A., has been appointed in his place.

Mr. C. J. Buchanan-Dunlop, M.C., M.A., has been appointed Assistant Secretary, in place of Mr. C. Burns, B.Sc., and Mr. K. D. C. Vernon, F.L.A., has been appointed the Society's first full-time Librarian.

Mr. E. F. Forder, who had been a member of the staff of the Examinations Department since 1927, resigned his position in May.

Mr. J. H. Buchanan, formerly Examinations Officer and Accountant of the Society, died on 18th May.

APPENDIX

STANDING COMMITTEES, 1947-48

Ex-officio members are indicated thus(*)

To save paper, distinctions after the name are given in the first instance only

FINANCE AND GENERAL PURPOSES COMMITTEE

Sir Harry Lindsay, K.C.I.E., C.B.E.

(*Chairman*).

Major W. H. Cadman, M.B.E., B.Sc.,

F.R.I.C., F.C.S., M.I.CHEM.E.

Sir Atul Chatterjee, G.C.I.E., K.C.S.I.

Sir Edward Crowe, K.C.M.G.

Sir Edward Gait, K.C.S.I., C.I.E.

E. W. Goodale, C.B.E., M.C.

R. W. Holland, O.B.E., M.A., M.Sc., LL.D.

Sir Henry McMahon, G.C.M.G., G.C.V.O.,
K.C.I.E., C.S.I.

G. K. Menzies, C.B.E.

J. A. Milne, C.B.E.

E. Munro Runtz, F.R.I.C.S.

William Will, C.B.E.

PAPERS AND MEDALS COMMITTEE

Sir Harry Lindsay (<i>Chairman</i>).	Professor C. S. Gibson, O.B.E., M.A., Sc.D., F.R.S.	Gordon Russell, C.B.E., M.C., R.D.I.
F. H. Andrews, O.B.E.	E. W. Goodale.	Sir Frank Smith, G.C.B., G.B.E., F.R.S.
A. C. Bossom, F.R.I.B.A., M.P.	Sir Henry McMahon.	William Will.*
Sir Atul Chatterjee.	J. A. Milne.	Sir John Woodhead,*
Sir Edward Crowe.	J. W. Ramsbottom, M.A.	G.C.I.E., K.C.S.I.
Professor E. C. Dodds, M.V.O., D.Sc., F.R.S.	A. R. N. Roberts.	Miss Anna Zinkeisen, R.O.I., R.D.I.
	E. Munro Runtz.*	

INTERNATIONAL EXHIBITION COMMITTEE

Viscount Samuel, P.C., G.C.B., G.B.E. (<i>Chairman</i>).	A. C. Bossom.	Sir Ernest Pooley, K.C.V.O., M.A., LL.B.
Lord Aberconway, C.B.E., HON. A.R.I.B.A.	Sir Atul Chatterjee.	
	E. W. Goodale.	
	Sir Harry Lindsay.*	

INDIA, PAKISTAN AND BURMA SECTION COMMITTEE

Sir John Woodhead, (<i>Chairman</i>).	Colonel Stuart Fraser, C.S.I., C.I.E.	Sir David Meek, C.I.E., O.B.E.
F. H. Andrews.	Sir Edward Gait.	Sir Alexander Murray, K.C.I.E., C.B.E.
Sir William Barton, K.C.I.E., C.S.I.	Sir Lancelot Graham, K.C.S.I., K.C.I.E.	Sir Frank Noyce, K.C.S.I., C.B.E.
Sir Frank Brown, C.I.E.	Lord Hailey, G.C.S.I., G.C.M.G., G.C.I.E.	Dewan Bahadur Sir Samuel E. Runganadhan.
Sir Atul Chatterjee.	Sir Kenneth Harper.	E. Munro Runtz.*
Sir John Clague, C.M.G., C.I.E.	Edwin Haward.	Sir Thomas Smith, V.D.
Sir Henry Craw, K.B.E., C.I.E.	Sir Harry Lindsay.	Sir John Tait.
Sir Kenneth Fitze, K.C.I.E., I.C.S.	Sir Hawthorne Lewis, K.C.S.I., K.C.I.F.	U Saw Ohn Tin.
	Sir Edward Maclagan, K.C.S.I., K.C.I.F.	Sir Alfred Watson.
	Sir Henry McMahon.	Sir Gilbert Wiles, K.C.I.E., C.S.I.
		William Will.*

DOMINIONS AND COLONIES SECTION COMMITTEE

Sir Harry Lindsay (<i>Chairman</i>).	Julian Mockford.	A. Wigglesworth.
K. W. Blackburn.	E. Munro Runtz.*	William Will.*
Sir Atul Chatterjee.	Prof. J. L. Simonsen, D.Sc., F.R.I.C., F.R.S.	B. D. Zohrab.
J. D. McAteer.	Stuart Underhill.	

EXAMINATIONS COMMITTEE

Sir Edward Crowe (<i>Chairman</i>).	E. M. Rich, C.B.E., F.C.G.I., B.Sc.
Sir Harry Lindsay.*	E. Munro Runtz.*
Dr. R. W. Holland.	Sir Henry A. Steward.
J. W. Ramsbottom.	William Will.*

Appointed by Central Education Authorities—

England (Ministry of Education)—C. E. Beevers, H.M.I., M.COM., LL.B.
 Welsh Department (Ministry of Education)—W. King, H.M.I., PH.D., M.A.
 Northern Ireland (Ministry of Education)—J. A. Glen, M.A.

Appointed by Local Education Authorities—

(L.C.C.), J. Brown, M.B.E., M.C., M.A., B.Sc.
 (L.C.C.), A. J. McIntosh, PH.D., B.COM.
 (Birmingham), A. M. B. Rule, M.A., LL.B.

(Bradford), Thomas Boyce, M.A., B.Sc.
 (Croydon), H. A. Warren, M.Sc.(ENG.), A.M.I.C.E.
 (East Ham), A. J. Jinkings, PH.D., B.Sc.
 (Halifax), B. R. Heasman, M.Sc.
 (Kent), E. W. Woodhead, M.A.
 (Liverpool), A. R. Burnett-Hurst, M.Sc.
 (Middlesex), T. B. Wheeler, M.A.
 (St. Helens), N. F. Newbury, M.A., M.Sc., F.R.I.C.
 (Surrey), R. Beloe, M.A.
 (West Ham), E. A. Rudge, PH.D.
 Association of Education Committees—Mrs. E. J. Gregory, O.B.E., J.P.
 Association of Directors and Secretaries for Education—J. Compton, M.A.

Appointed by Association of Governing Bodies and Principals of Technical Institutions—
 Association of Technical Institutions—G. H. Austin, PH.D., B.A.

Appointed by Teachers' Associations—

Association of Principals of Technical Institutions—B. H. T. Matthews, B.Sc., F.R.ECON.S.
 Association of Principals of L.C.C. Commercial Institutes—D. Wilsden, M.A., LL.B.
 Continuative Teachers' Association—W. T. Scales.
 Association of Teachers of Technical Institutions—J. H. Harvey, B.COM.
 National Union of Teachers—J. H. Wooldridge.

Appointed by Commercial and Professional Bodies—

Association of British Chambers of Commerce—Col. R. H. Goldthorp, D.S.O., T.D., J.P.
 British Council—Miss B. Gravenall, PH.D.
 Chartered Institute of Secretaries—A. Gale Johnson, F.C.I.S.
 Federation of British Industries—W. Waterhouse Gibbins, M.A.
 Institute of Bankers—Maurice Megrah.
 Institute of Chartered Accountants—G. R. Freeman, F.C.A.
 Institute of Transport—F. W. Crews, B.A., A.C.I.S.
 Society of Incorporated Accountants and Auditors—Walter Holman, F.S.A.A.

Co-opted Members—

H. L. Carrad, B.A., and L. A. Terry, B.COM.

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F. H. Andrews.	Miss M. France.	Gordon Russell, C.B.E., R.D.I. (Design and In- dustries Association).
W. H. Ansell, M.C., F.P.R.I.B.A.	A. E. Gray.	Harold W. Sanderson.
E. J. Archer.	James H. Hogan, R.D.I. (Deceased Jan., 1948).	H. V. Shelton.
Colonel W. A. Bristow.	J. Douglas Hood.	Sir Charles Tennyson, C.M.G. (Federation of British Industries).
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Sir Edward Crowe.	J. A. Milne.	William Will.*
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	A. J. F. Morton.	
	C. S. Newton.	
	H. E. Plaistow.	
	A. B. Read, R.D.I.	

(This Committee has since been reconstituted)

THOMAS GRAY MEMORIAL TRUST COMMITTEE

Capt. L. G. Garbett, C.B.E., R.N. (ret'd.) (<i>Chairman</i>).	James A. Edgar.	Capt. A. H. Ryley, C.B.E. (Resigned March, 1948).
Sir Westcott S. Abell, K.B.E.	Dr. R. W. Holland.	
A. C. Bosson.	Sir Harry Lindsay.*	Sir Wavell Wakefield, M.A., M.P.
Lt.-Col. P. J. Cowan, M.B.E., M.I.C.E., M.I.MECH.E.	Capt. J. H. Quick.	
Capt. W. E. Crumplin.	Capt. F. A. Richardson.	Capt. G. W. Wakeford.
	E. Munro Runtz.*	William Will.*

"R.D.I." JOINT COMMITTEE

Appointed by the Council—

J. A. Milne (<i>Chairman</i>).	Sir Henry McMahon.
F. H. Andrews.	F. A. Mercer.
E. W. Goodale.	Sir Ernest Pooley.

Representatives of the Faculty for 1947—

Gordon Russell (<i>Master of the Faculty of</i> <i>R.D.I.</i>).	Sir Francis Meynell.
Reco Capey.	A. B. Read.
	Miss Anna Zinkeisen.

SOCIETY'S HOUSE COMMITTEE

J. A. Milne (<i>Chairman</i>).	Sir Harry Lindsay.*	Percy Delf Smith.
Lord Aberconway.	E. Munro Runtz.	William Will.*

LIBRARY COMMITTEE

Professor E. C. Dodds (<i>Chairman</i>).	Sir Edward Crowe.
Professor E. N. da C. Andrade, D.Sc., PH.D., F.R.S.	Sir Harry Lindsay.*
F. H. Andrews.	L. R. McColvin.
L. J. F. Brimble.	E. Munro Runtz.*
Sir Atul Chatterjee.	William Will.*
	J. G. Wilson, C.B.E.

MEMBERSHIP COMMITTEE

J. A. Milne (<i>Chairman</i>).	Sir Thomas Dunlop,	E. Munro Runtz.*
Sir Frank Brown.	K.C.M.G.	William Will.*
	Sir Harry Lindsay.*	

REPRESENTATIVES OF THE SOCIETY

The following are the present representatives of the Society upon the Governing Bodies and Committees of other organisations:

City and Guilds of London Institute (Council and Executive Committee of the Department of Technology)—Dr. R. W. Holland, nominated by Chairman of Royal Society of Arts Council.

R.I.B.A. Board of Architectural Education—A. C. Bosson.

Architects' Registration Council Board of Architectural Education—Oswald P. Milne.

Council for the Preservation of Rural England—J. A. Milne and G. K. Menzies (Council); G. K. Menzies (Panels Committee).

Chadwick Trust (Trustees)—E. M. Rich.

London Society (Council)—Lord Broughshane.

Soane Museum (Trustees)—Professor A. E. Richardson, R.A.

National Film Library of the British Film Institute (Management Committee)—Sir Harry Lindsay.

Charing Cross Hospital (Life Governor)—Brigadier Sir Edward A. Tandy.

Institute of Physics—Sir Clifford Paterson.

Standards Committee of the Directorate of Post-War Building—F. H. Andrews.

THE CHAIRMAN moved the adoption of the Report.

Sir ATUL CHATTERJEE in seconding this motion, said: After the very excellent and most interesting summary of the Report that you have just listened to from our Chairman, I do not think it is necessary for me to say much in order to second its adoption. You will have gathered that the Society is going on from strength to strength. It has maintained all its many-sided activities, and it has embarked on new and very important activities. I am sure you will all agree that under the guidance of our present Chairman, about whom you will hear a little more later on, we are doing very well, and I should now like formally to second the adoption of the Report.

THE CHAIRMAN then called for any comments on the Report.

Mr. LYNDON HAYNES: I wonder whether the incoming Council would consider having an occasional lecture at an hour later than the customary hour. I have been a member of the Society for a number of years. Admittedly there were the war years during that time, but this is only the fourth meeting I have been able to attend. I would therefore like to suggest that an occasional meeting of possibly more general interest, perhaps in connection with another Society, or on our own, might be held at a later hour. I think it would be helpful. We might see some new faces at these meetings—people who normally cannot get along.

I would call upon the strength of the people who are not here to support me. Those who cannot be here at 2.30 probably for the same reason would not be able to be here at 4.30. Far be it from me to sectionalise ourselves in any way, but I think it would be a great gesture if an occasional meeting could be held later—perhaps at 7 o'clock. Why not have one, as an experiment? Let us see what happens!

He was supported in this proposal by Mr. F. D. CHARLES and Mr. REX B. HARTLEY.

THE CHAIRMAN promised that the Council would consider the suggestion.

Mr. W. H. PIKE: You made a statement, Mr. Chairman, about our old colleague, Lord Bennett. I feel I can call him colleague, because I esteemed him very highly. May I be permitted to make a suggestion that a book should this year be produced which could include the history of our late friend? We should also have his photograph incorporated in it, together with that of our new President. Permit me also to suggest that the photograph of the members of the Council should also be incorporated in the book as a lasting memento of this memorable year. I only put that as a suggestion for the Council to consider.

THE CHAIRMAN: We shall consider this suggestion also; but I think the names of our Presidents are already written in our hearts, and I do not know that a special book is really necessary.

The Report was then adopted.

Mr. WILL: The outstanding fact disclosed by the figures before you is that we are able to show an excess of income over expenditure of £3,597 as against £462

in 1946. The only important change in the Balance Sheet is the addition of Lord Bennett's bequest of £2,500, which is added to the General Fund assets.

In the Income and Expenditure Account, we find, not unexpectedly, increases in the *Journal* printing, paper and postages. In the Examinations Department the examiners' fees were increased by £1,130, owing entirely to the increased number of papers examined. All the other items under "Examinations" have naturally increased except the item for expenses, which shows a fall of £717 owing to the fact that in 1946 there were non-recurring expenses for the removal of the department from Reading to London. On the income side of the Examinations Department the great increase in the fees received from entrants will be noted. This was due to the growing popularity of the examinations to which you, Mr. Chairman, have referred, and the increased tariffs which the Council authorised.

Now it would be a mistake to assume there can be a repetition of this success, as the increased fees granted to examiners and the improved salaries and wages in this and other departments must largely account for the surplus next year.

Besides the Examinations Department and the *Journal* items referred to, salaries, wages and superannuation have increased by just over £500; and certain non-recurring expenditure has increased the lighting, heating, etc., item.

On the income side the increase in the membership is reflected in the increased income of £922. The *Journal* advertisements are improved by about £300.

The General Purposes Capital Account remains nearly the same as in 1946. £3,852 have been spent on war damage repairs; £280 have been recovered, making the outlay £3,572. The favourable balance of £3,597 more than makes up for the repairs payments, and a considerable further amount is due to be received from the War Damages Commission in respect of these repairs.

In submitting these figures, your Treasurers would like to emphasise that in view of the rising costs and the increased activities of the Society, the present agreeable financial statement should not be received with undue optimism.

I beg to move the adoption of the financial statements.

THE CHAIRMAN: We shall very much regret the fact that this is the last statement and presentation of accounts by Mr. Will after five years of very valuable service to us as one of our two Honorary Treasurers. We should also now express thanks to Sir Edward Crowe who has kindly agreed to serve as Honorary Treasurer with Mr. Runtz.

Mr. RUNTZ seconded the motion.

The accounts were adopted.

The new list of Council having been suspended in the Library in accordance with the Bye-Laws, and no additional nominations having been made, the Chairman called on the Secretary to announce the new Council for 1948-49, and the following were declared to fill the several offices. (The names in italics are those of Fellows who have not, during the past year, filled the offices to which they have been elected):—

PRESIDENT

Her Royal Highness The Princess Elizabeth, Duchess of Edinburgh, C.I.

VICE-PRESIDENTS

Lord Aberconway, C.B.E., Hon. A.R.I.B.A.

F. H. Andrews, O.B.E.

Gerald Barry.

A. C. Bossom, F.R.I.B.A., M.P.

Major W. H. Cadman, M.B.E., B.Sc.,
F.R.I.C., F.C.S., M.I.CHEM.E.

Professor E. C. Dodds, M.V.O., D.Sc.,
M.D., PH.D., F.R.C.P., F.R.S.

Sir Thomas Dunlop, K.C.M.G.

*Sir Edward Gait, K.C.S.I., C.I.E.

Captain L. G. Garbett, C.B.E., R.N.(RETD.).

Sir Angus Gillan, K.B.E., C.M.G.

Dame Caroline Haslett, D.B.E., COMP.I.E.E.

Robert W. Holland, O.B.E., M.A., M.Sc., LL.D.

Sir Harry A. F. Lindsay, K.C.I.E., C.B.E.
(*Chairman*).

Hugh Lyon, M.C., M.A.

*Sir Henry McMahon, G.C.M.G., G.C.V.O.,
K.C.I.E., C.S.I.

*G. K. Menzies, C.B.E., M.A.

*John A. Milne, C.B.E.

Sir Ernest Pooley, K.C.V.O., LL.B.

J. W. Ramsbottom, M.A.

Viscount Samuel, P.C., G.C.B., G.B.E.

Sir Frank Smith, G.C.B., G.B.E., F.R.S.

John G. Wilson, C.B.E.

Sir John Woodhead, G.C.I.E., K.C.S.I.

Miss Anna Zinkeisen, R.O.I., R.D.I.

ORDINARY MEMBERS OF COUNCIL.

Sir Alexander Aikman, C.I.E.

Professor E. N. da C. Andrade, D.Sc.,
PH.D., F.R.S.

Sir Frank H. Brown, C.I.E.

Sir Atul C. Chatterjee, G.C.I.E., K.C.S.I.

P. Le Neve Foster.

John Gloag, Hon. A.R.I.B.A.

E. W. Goodale, C.B.E., M.C.

Professor C. S. Gibson, O.B.E., M.A.,
SC.D., F.R.S.

F. A. Mercer.

E. M. Rich, C.B.E., F.C.G.I., B.Sc.

A. R. N. Roberts

William Will, C.B.E.

ORDINARY MEMBER OF COUNCIL

(*ex-officio*)

Gordon Russell, C.B.E., M.C., R.D.I. (Master
of the Faculty of R.D.I.).

TREASURERS

Sir Edward Crowe, K.C.M.G.

E. Munro Runtz, F.R.I.C.S.

* Indicates President's Nominee.

MR. J. A. MILNE: It is my pleasant task to propose a vote of thanks to the Staff. For my part, after many years of fairly close contact with our staff I think I can safely say that we have always been fortunate in having a very loyal and enthusiastic band of helpers who might well be the envy of any society. That was never truer than it is to-day. The fact that everything runs so smoothly is largely due to their efforts, and they always appear to have a very close personal interest in the welfare of the Society which is probably the keynote of their success.

But all these things are dependent on good leadership, and in that we are lucky in possessing it in an ideal form in the person of our able and popular Secretary, Mr. Luckhurst. It is he who sets the example, and who is the moving spirit in the conduct of the executive. In this he is ably helped by his assistant, Mr. Buchanan-Dunlop, and by his chief clerk, Mr. Samson. Then we have Mr. Broad, the doyen of the Examinations Department, who presides paternally over his happy family in Victoria Street and who inspires them with a lot of his own indomitable energy, cheerfulness and modesty. Under the competent supervision of Mr. Steib nothing deters the examinations staff from facing up to everything that comes their way, however difficult, in this highly specialised and all-important department. A word of praise is also due to Mr. Nicholls for the quiet and efficient way in which he runs the Printing Department. We are indeed sorry that in the past year we have lost the services of Mr. Toye, that veteran stalwart who served us so faithfully and well

for nearly fifty years and whose kindly presence we still miss at the receipt of custom. Mr. Toye may rest assured that he has the cordial good wishes of all of us in his well-earned retirement. Mr. Purdam, a newcomer, has succeeded Mr. Toye, and we hope, with the help of our old friend, Mr. Baker, that he also will become a permanent institution like his predecessor. During the year Mr. and Mrs. James have also retired after long service, and Mr. Giddy, who is well known to us, now keeps diligent and faithful guard over the premises and particularly in the entrance hall. It is naturally not possible to mention everybody by name, but they may all rest assured that it is our desire to make them happy and that we are proud of them. I have very much pleasure in proposing this vote of thanks.

MR. ANDREWS: I should like to endorse every word that Mr. Milne has said in appreciation of the work of the staff. The smoothness with which everything has gone in the day-to-day work has always filled me with something like amazement and certainly a great deal of admiration. I therefore have the greatest pleasure in seconding the vote of thanks.

The vote of thanks was carried by acclamation.

THE SECRETARY: I find it quite embarrassing to reply to such kindly, gracious and graceful words of appreciation. This vote of thanks to the staff is an annual event, but happily it is no mere routine occurrence. The relations between the staff and the Council are characterised throughout the year by mutual respect and sympathy, and this is the occasion when, once a year, those feelings may be verbally expressed. Therefore we appreciate these kind words, because we are conscious throughout the year of the kindly spirit towards us of which they form the expression this afternoon.

Mr. Milne has referred to the staff's pride in the Society. The Society is yours—it belongs to you, Sir, and to your fellow-members. You are the members, but we are its servants, and we have in our own station an equal pride and equally proprietary feelings towards it. So the Society is rather in the position of a lady with two suitors, each laying claim to it. It should have quite a good time—and I think it does!

I think the staff would like me to take this opportunity of referring to the very practical way in which the Council have recently shown their appreciation of our services. We feel very grateful for the generous treatment which we have always received, and I am glad of this opportunity of saying so publicly.

I should like to associate myself with what Mr. Milne has said with regard to the colleagues whom we have lost this year—Mr. Toye, Mr. and Mrs. James and Mr. Forder. We miss them greatly. At the same time I would like to say how happy we are in welcoming their successors and the other new members of the staff who have so fully entered into the spirit of this body. I do thank you, Sir, and through you everyone present, for the Society's appreciation of our services. As far as I personally am concerned, the words are quite undeserved, but we assure you that we are extremely happy in our work and appreciate the privilege of serving this Society.

SIR EDWARD CROWE: I have much pleasure in proposing a hearty vote of thanks to our Chairman. Sir Harry Lindsay is so modest that he would hate me to say the things which I would say if he were not in the room.

I have known him for twenty-five years and we have had much the same sort of careers. We have both been Civil Servants who have turned to commercial matters. I do not mean to say we went into business, but we tried to help business men with advice and I can assure you that Harry Lindsay did his job in a most marvellous way. Sir Atul Chatterjee would confirm that, because for a long time Sir Harry worked under him as Trade Commissioner for India. Then he went to the Imperial Institute where I had the great pleasure for some years of co-operating with him. I would like to seize this opportunity to say how valuable to the whole Empire has been Sir Harry's brilliant work at the Imperial Institute. Sir Harry and I were also on the Empire Marketing Board. So I have had many opportunities of seeing what a wise man he is, how tactful, how efficient and how splendid he is in carrying out everything he undertakes.

Now we have had him as Chairman for a whole year, and we can contemplate with pleasure his second year. I am absolutely certain that during his chairmanship this Society, as Mr. Milne said, will go on from strength to strength. As long as Sir Harry is in the Chair we can be confident we shall prosper and flourish. He has an excellent Council; he knows how to get the best out of them. He has a splendid staff. He likes them and they like him.

In the Indian and Colonial Committees of this Society he has given us an example of his superb chairmanship. Having seen him handle problems of all sorts—from ordinary humdrum ones to those of great delicacy—I realised that he would make an ideal chairman of the R.S.A. and I have looked forward to the time when he would find it possible to accept this position.

We are indeed grateful to Sir Harry for his guidance throughout a happy and successful year.

SIR HENRY MCMAHON: Following my friend, Sir Edward Crowe, I do not find myself with anything to say, because as usual he has said everything that is necessary.

However, I know you will all be with me in saying how much we value Sir Harry Lindsay as our Chairman and how much we love serving under him. He gives his whole time to us, and all his great ability. I have much pleasure in seconding the vote of thanks.

The vote of thanks was carried with acclamation.

THE CHAIRMAN: I do not really know how to thank you enough. To be quite frank, the work of the Chairman of your Council is a great deal more than I had bargained for when I, perhaps rather lightheartedly, took it on. But there it is. I am devoted to the interests of this grand Society, and I would work to the bone for it. We—both the Council and may I also say the Staff of the Society—really are a very happy team all working together in the interests of the Society. Thank you very much.

The meeting then terminated.

CRAFTSMANSHIP

(VII) ENGLISH FURNITURE—TRADITIONAL AND MODERN

By R. W. SYMONDS, L.R.I.B.A.

Twentieth Ordinary Meeting, Wednesday, April 28th, 1948

Mr. JOHN GLOAG, HON.A.R.I.B.A., *in the Chair*

THE CHAIRMAN: The subject of the paper this afternoon is "Craftsmanship in Furniture—Traditional and Modern" and the author is Mr. R. W. Symonds. Mr. Symonds is a rather exceptional person. Not only is he the most scholarly and able writer in this country on the subject of furniture but he is himself a most able designer of furniture. I think I may say that the work which Mr. Symonds has done on furniture design has taken up the tradition of English furniture where it ended during the Regency. There was an interval after Sheraton and his imitators had disappeared from the scene, an interval which perhaps we had better say nothing about. In that interval there was a handicraft revival which attempted to take up an earlier tradition. Mr. Symonds represents a school of design which is to-day unique. His own work is significant and original, yet it is as English as Chippendale's work and Hepplewhite's work and all the work that distinguished that golden age of cabinet making, the eighteenth century.

During the period that has elapsed between 1921 and 1947, Mr. Symonds has written six books, each of which has opened up some refreshing, new and scholarly aspect of the subject of furniture design. The first was a book, with which he made his name in the literature of the subject in 1921, entitled "The Present State of Old English Furniture", and the last was a popular book published in the King Penguin series, "A Book of English Clocks", which was issued last year. I would refer to one other outstanding book by Mr. Symonds, entitled "Masterpieces of English Furniture and Clocks", which was published in 1940.

It is a very great privilege for us to hear Mr. Symonds to-day. He is one of those rare people who does not indulge in sentimental twaddle about antique furniture. He approaches the whole subject not from the purely phoney point of view of reverence for age, but with a true, deep and knowledgeable understanding of the significance of design. It gives me much pleasure to ask Mr. Symonds to read his paper.

The following paper was then read:

Craftsmanship in the making of English furniture followed a path of increasing refinement from medieval times to the eighteenth century. A thousand years ago, when furniture making was a branch of carpentry, the craftsmanship was rough and ready, and coarseness and heaviness were the chief characteristics of tables, benches, aumbries and chests of Saxon and Norman England.

The carpenter's craft was mainly concerned with large scale structural work—timber-framed buildings, roofs, drawbridges—in which strength and massiveness were the characteristic features. Carpentry, therefore, with its "heavy timbers" and its rough workmanship, was not suitable for the production of an article so small in scale as a bench or chest. It was during the process of amending the carpenter's craft to produce careful work, small in scale, that the craft of the joiner was evolved; for as one seventeenth century author put it "they that are taught to work more roughly, do with greater difficulty perform the curious and nice work".

It was this difference in technique which finally divided the joiners from the parent body of carpenters. The strength of a joined article resides in the firmness and accuracy in the making of the joints; whereas in carpentry, strength is mainly

derived from the size and position of the timbers forming the construction. Other features of the old joiner's craft were the making of surfaces "exactly flat and smooth", so that the whole article "shows all one piece", and the accurate working of mouldings. In time, the joiner's craft subdivided into joiners who made the interior woodwork and panelling of houses, and those who made movable furniture. There were also carvers and the turners, who supplied the ornament. It was during the seventeenth century that the joiner who made chairs became a specialist in this branch. Not all chairs, however, were made by joiners, for the cheap chair trade was already in the hands of the turner chair-makers. Yet another division was the joiner who made boxes and cases, the latter including clock-cases.

The late seventeenth century saw the greatest refinement and specialisation of furniture-making, namely, that of cabinet-making. The cabinet-maker's craft was brought into being by a new technique—veneering. The overlaying of a carcass with thin sawn veneer, was entirely different from the making of furniture in the solid wood, which was the joiner's method. With the introduction of veneering, the cabinet-maker now made the best furniture, and the joiner furniture-maker took second place.

This division of labour in the furniture trade increased towards the end of the seventeenth century, and continued throughout the eighteenth. Cane-chair-makers, looking-glass-makers, japanners, joiners who made wainscot furniture, and joiners who made chair and bed-frames for the upholsterers, came into being. The making of cellarets and wine coolers was also another specialist occupation.

Of the carver's craft, there were many sub-divisions, apart from that of the furniture-carver who worked for the chair- and cabinet-makers. There were carvers who worked for the house joiners, for ship builders and coachmakers. Apart from these, there was also the important "carver and gilder", who carved and gilded looking-glass and picture-frames, tables, stands, chairs, wall girandoles and candelabra.

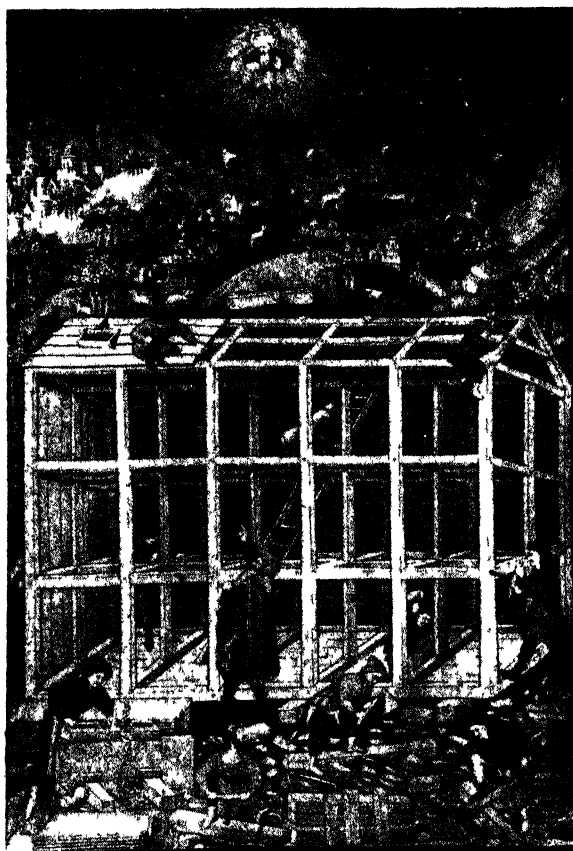
There was, of course, an economic basis for this division of labour. As a system it worked to perfection when there was a steady demand for goods, and a busy cabinet-maker was fully aware of its advantages. The constant repetition of the same kind of work—carving chair-frames, making drawers, veneering—produced greater skill in the craftsman and also enabled him to work more rapidly. No time was wasted in changing over and settling down to another process, and proficiency was achieved more quickly.

The current popular conception of the old craftsman as a creative artist in love with his work, producing in its entirety every variety of furniture, is an erroneous one. The seventeenth and eighteenth century woodworker never did this, unless he was trying to earn a living among a small rural community, making a table or bench one day, repairing a farmer's cart the next, and making and fitting a cottage door the day after that. But in this case the workmanship was crude and the wood used of local growth and of coarse texture, such as oak, ash, beech and elm.

This view of the creative hand craftsman is a reaction against the soullessness of most modern industries, where the worker has to perform a meaningless, mechanical task to a degree of monotony unthought of by his artisan forbear of two hundred

years ago. And to this extent it is perhaps true enough, only the life of the old craftsman was never as idyllic as is commonly supposed.

Our ancestors fully realised the importance of training the young craftsman, and he was apprenticed to a master craftsman for seven years. During this time he was taught everything about his craft, the general principles of which were to use a construction in conformity with the material, and to allow construction to dictate



(By Courtesy of the Trustees of the British Museum)

FIG. 1 —A carpenter's construction of framed timber. Noah supervising the building of the ark, taken from the *Bedford Book of Hours*, which was executed c 1425.

design. In a sentence, he was taught to base the form and proportion of his wares upon their functional use.

Craft guilds, or companies as later they were called, were formed to organise the handicrafts, each craft having its own. Before a craftsman could set up business, he had to belong to the local guild or company appertaining to his handicraft. In provincial towns where craftsmen were few in number, several handicrafts combined together in one company; for example, the carpenters and joiners of Worcester, and the joiners and turners of Chester. Every company had its own

ordinances, or bye-laws, which laid down the regulations of the government of the company. The members of a company were divided into three distinct ranks—apprentices, journeymen, and master-craftsmen. The apprentice, after he had served his term of seven years, became a freeman of his company, and, at the same time, a journeyman, in which capacity he had to work for a master-craftsman for a further two years. He could then either continue as a journeyman or become a master himself.

A master-craftsman was a man of position in his craft, and a householder.

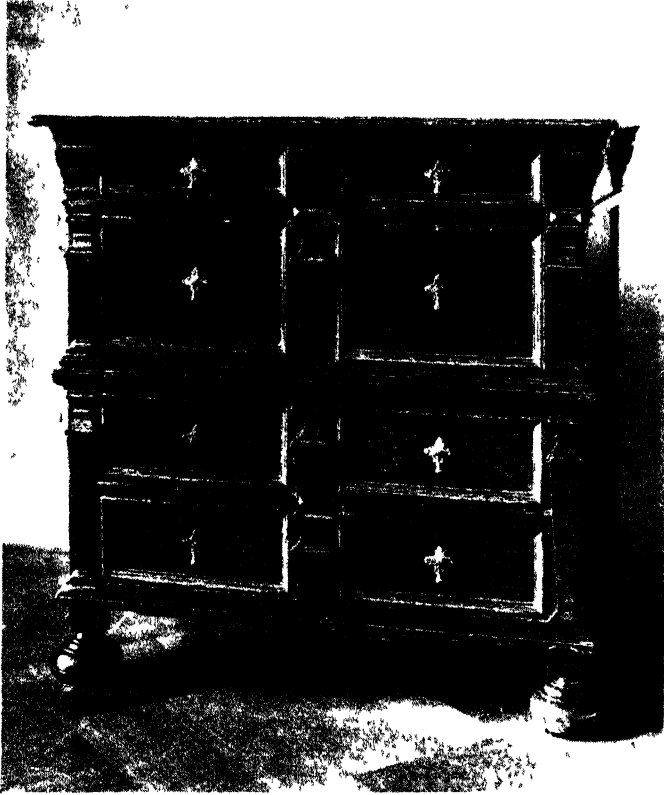


FIG. 2.—*A chest of drawers of mid-17th century date of joiner's construction from solid oak.*

He trained apprentices and employed journeymen. He could gain eminence as a member of his company, become first a Warden and then the Master of the company; after which he became a permanent member of the company's governing body, known as the Court of Assistants.

An important check was exercised over the members of a craft guild or company by the regulation known as "Power of Search". This entitled the Master and Wardens to search for "bad and deceitful workmanship" in the workshops of members of the company. Badly made articles were given to the poor, destroyed or ordered to be improved. For this offence, the craftsman was fined, or set in the

pillory, or punished in some way. "Power of Search" not only meant the protection of the public against faulty goods, but set a standard for both craftsmanship and material.

Another important ordinance was the one which laid down the number of apprentices a master-craftsman should have at a time. This was to prevent unemployment, for an apprentice was a cheap form of labour. A large number of

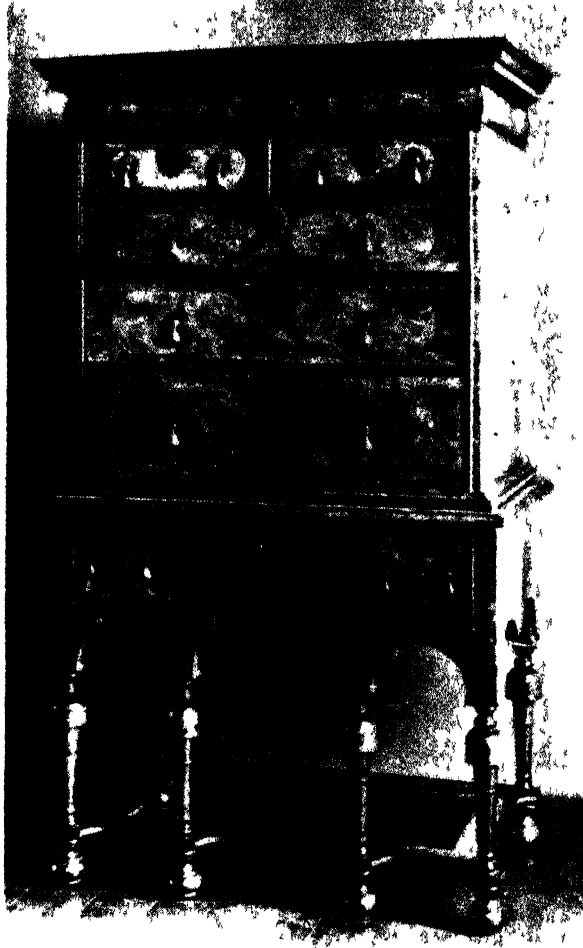


FIG. 3.—*A walnut chest on stand decorated with figured walnut and elm veneer. This chest is a product of the cabinet-maker's craft of the period of Queen Anne.*

apprentices, therefore, meant a large number of journeymen after the statutory period of seven years, all of whom might not find employment.

A company also saw that its members were protected from competition by "foreigners" (*i.e.*, non-freemen), who might enter the town and start up in business.

The ordinances of the Joiners' Company of Kingston-upon-Hill (1598) enacted that:

"Noe persons butt such as be free of the same occupacion, or there servants, shall sell any newe and unoccupied Cubbord, bedstead, or table, or any other Joyner wayres within this towne (except in the faire tyme) upon paine to forfeit for everie tyme soe doeing or sellinge of any iijs. iiijd. to the towne and iijs. iiijd. to the said occupacion of Joyners". (*Two Thousand Years of Gild Life* by the Rev. J. Malet Lambert, 1891.)

At the end of the seventeenth century the companies of handicraftsmen began to lose their power, firstly in London where trade was greatest, then throughout the country. An enlarged home market and an increasing demand for English furniture from Colonial America and elsewhere abroad, burst the narrow confines of company regulations which had been framed in the Middle Ages when workshops were small, apprentices and journeymen few, the market restricted and society stable. Joiners and cabinet-makers with flourishing businesses now wanted as many apprentices and journeymen as they could employ. Their aim was a satisfied customer and personal profit, not the approval of their company's Wardens. Quantity was put before quality; capitalist individualism before the collective good of the handicraft fraternity. The authority of the joiners' companies, London and provincial, grew less and less until, in the eighteenth century, it disappeared.

The effective dissolution of the companies was part of the general movement towards industrialisation which, by the end of the eighteenth century, was in full swing in England. Methods for speeding up production had arrived. In the furniture trade there were yet more divisions of labour amounting to semi-mass production methods with standardisation of design (particularly noticeable in cheap chairs made by the turners). Carving was imitated in composition and papier mâché cast in moulds; furniture brassware, formerly cast and chased, was now produced by die stamping.

The same tendency to increase and cheapen production occurred in other handicrafts: ornamental ironwork was cast instead of being wrought by hand, and the method of transfer printing was used instead of hand painting. Both these processes reduced cost and quickened production in iron and china industries. Semi-mass production methods were also introduced into watch-making.

The eighteenth century saw the decline of craftsmanship; it also saw the finest craftsmanship of English furniture-makers. The best and the worst ran side by side. The reason for this was that not only did a growing population and an increasing export trade demand the production of low-priced furniture, but the chair- and cabinet-makers had also to meet the demands of a wealthy society composed of the nobility, merchants and bankers. And for them the London cabinet-makers produced furniture of the highest possible quality. Much of it was of mahogany decorated with carving (this applied particularly to chairs); much of it—cabinets, escritaires, commodes—was of lighter toned woods such as satinwood and hawthorn decorated with exquisite inlay work, and sometimes in addition, with finely-chased fire-gilt mounts.

This high quality cabinet-ware ceased to be produced as the end of the eighteenth century approached; and in the first quarter of the nineteenth century there came a

distinct lowering of the standard of furniture-making, both in craftsmanship and design. The race between quality and quantity had been run, and quantity had won.

This brief review has tried to show that the rise and fall of handcraftsmanship in English furniture-making was mainly influenced by the law of supply and demand, and that craftsmanship, in the old joinery and cabinet-making, was not simply the inspiration of the craftsman for his job.

There were some London master-craftsmen who produced work of the highest quality and of the most elegant design, but the inspiration came to such craftsmen

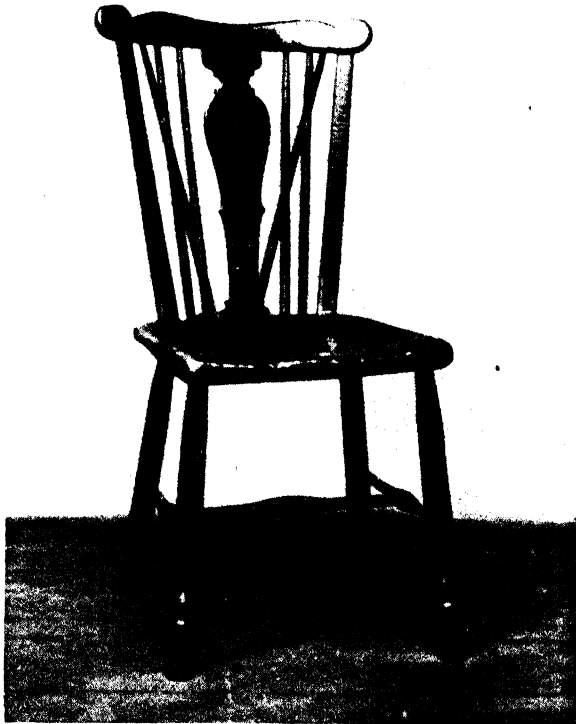


FIG. 4.—*A stick chair made of elm and beech. Chairs of this type were made in large quantities by the turners who followed mass produced methods.*

rather by reason of the wealth of their patrons to whom nothing would satisfy but the very best that contemporary craftsmanship could produce. These craftsmen of the first rank undoubtedly did experience joy in handling fine woods and producing beautiful furniture. But this pleasure, I am sure, was denied to the great number of master chair- and cabinet-makers, whose livelihoods depended on the making, from cheap woods, of the hum-drum furniture for the average citizen's home.

That there was bad craftsmanship, and plenty of it, is evident by the Joiners' companies having the power to search for bad and deceitful workmanship in the workshops of their members. A source of poor craftsmanship was the extensive use

of cheap apprenticeship labour by master-craftsmen greedy for profit. Universal acceptance, in the late eighteenth and early nineteenth century, of a lower standard of quality in order to increase production, is a further sign of the way the furniture craftsman was influenced by economic conditions.

The Act of Artificers of the fifth reign of Elizabeth (1562) gives some idea of the working day of a handicraftsman. It is laid down that "all Artificers and Labourers" between March and September shall work from five or earlier in the morning to seven or eight at night; and from September to March the hours of work shall be from "the Spring of the Day in the Morning until the Night of the same Day". During the day, half-an-hour was allowed for breakfast, half-an-hour for drinking, and an hour for the mid-day meal. Also between "Midst of May to Midst of August" half-an-hour "at the most" was allowed for resting. These conditions applied both to handicraftsmen and agricultural labourers and were dictated by the hours of daylight; for the lighting of an indoor worker's shop could not be adequately supplied by candles or hanging oil lamps.

The economic factor in furniture-making not only left its mark on the quality of the workmanship, but also in the design. Fine furniture timber was unduly expensive in England because none of it was home-grown and it had to be brought from abroad. This applied to all the chief woods—oak, walnut, mahogany, satinwood. Home-grown timber only produced coarse textured woods—beech, elm, ash, and fruit woods, suitable for cheap furniture. English oak was of crooked growth and had none of the mild texture and straight grain of wainscot oak imported from the Baltic, and English walnut was an unsound wood with none of the good qualities of the Continental variety.

Fine Cuban mahogany, of hard and close texture, was expensive and only used by chair-makers for their best work. Owing to the strength of this wood, chair frames could be made slender with elegant curved legs and arms. But sets of such mahogany chairs were costly and only the wealthy could afford them. The dining chair of the ordinary citizen's home not only lacked this elegance—the frame in the poorer and cheaper mahogany example had to have, for strength, thicker and clumsier legs and arms—but it was smaller and restrained in design. It had none of the sense of luxurious form of the chair made for a nobleman's mansion, for which timber was extravagantly used. Chair-makers had to choose the wood, and use the quality, which suited their customer's purse; for in the eighteenth century material, more than labour, influenced the cost of furniture.

One distinguishing feature of English craftsmanship of the seventeenth and eighteenth centuries is that the joiner and cabinet-maker paid as much attention to the inside, as to the outside, of a piece of furniture. Any interior part that was visible, such as the inside of a cupboard, or of a drawer, was made of hard wood—oak, pencil cedar, virginia walnut, or mahogany, according to the period; and only cheap furniture had soft deal, or pine, showing inside cupboards and drawers. The execution of the dovetailing and rabbeting of the bottoms of small drawers in English cabinets and desks, is not equalled by any other country, for even the work of the best French *maitre ébéniste* does not reach the English standard.

The carving of the eighteenth century has great variation in quality. The best, which reached a superlatively high standard, was the work of London craftsmen

who supplied furniture to the wealthy aristocracy. Carving of middling quality was the work of craftsmen who supplied furniture for the homes of well-to-do citizens.

The furniture of this latter class was of both London and provincial make. There was considerable activity in the chair-and cabinet-makers' trades in the larger provincial towns of the eighteenth century, judging from the furniture, especially of midland county origin, which has survived. Provincial furniture, on the whole, not only lacked the quality of craftsmanship of the London-made article, but there was considerable variation in design particularly between the north and the south. For instance, north country chairs—Lancashire, Yorkshire and Derbyshire—were more sturdily constructed, the legs and uprights to the back were heavier and often stretchers were fitted. Also case furniture—bookcases,

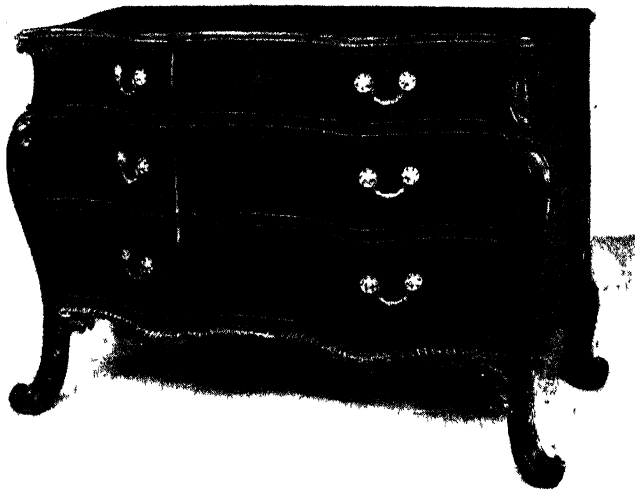


FIG. 5.—*A shaped front commode decorated with fine carving and figured veneer ; the work of a highly skilled mid-18th century cabinet-maker.*

cabinets and escritoire bookcases—had not the good proportions of the London product.

Besides London and provincial craftsmanship, there is yet one other class to be considered—the craftsmanship which produced the furniture of the English countryside. It is quite distinct, and has little in common with the craftsmanship of the town.

Many rural chairs and tables follow the construction used by the turner, the legs being dowel jointed into the wooden chair seat or table top. The legs were plain turned and so were the spindles forming the backs of the chairs. This type of country turned chair and table is known to-day as "stick furniture". There were also chairs and tables of the joiner's construction with the legs and rails held together by mortice and tenon joints. Chests and boxes were formed of boards, nailed or pegged together. Settles, dressers, corner-cupboards, benches, chests

of drawers, bread troughs, also of joined and panelled or boarded construction, were other common pieces of furniture of the English countryside.

The material used by the country craftsmen was local grown wood—oak, elm, beech, ash and the fruitwoods, apple, pear, cherry, plum; also to a lesser degree, yew. The cost and difficulties of transport in the seventeenth and eighteenth centuries made any timber other than that felled within a short radius, too expensive for a rural craftsman to buy. He therefore used the wood that was at hand, and for this reason country-made furniture shows great variation in its material; several



FIG. 6.—*A mahogany arm-chair of mid-18th century date. The elegant design of this chair denotes the best workmanship of the London chairmaker's craft.*

woods often being employed in the making of one article. Especially was this so with regard to turned chairs and tables.

Although the craftsmanship of country-made furniture was rough and ready, and of the simplest and most straightforward construction, this did not deny its design æsthetic quality. As furniture it fulfilled all the principles of good design. It was economic in cost and it reflected the simple life in cottage and farmhouse. Unlike the furniture of the town, its design did not change at the bid of fashion; it was made for use in the slow-moving world of the countryside, where social habits

exhibited no perceptible change from one generation to another. The farmer still led the life of his medieval ancestors. He and his family dined in the hall-parlour at one table, and his farm hands sat on benches at another. Little that was new came along to alter the mode of country life until the Industrial Revolution which brought the railways, but even this great upheaval took over half a century to revolutionise the English countryside. For this reason rural furniture in the eighteenth century had very much in common with that of the seventeenth century, and the rural furniture of the seventeenth century with that of the sixteenth.

These many aspects of traditional furniture-making show, I think, how complex is the subject of craftsmanship as applied to the furniture crafts. For instance, I have described how furniture was made in varying economic grades to meet the needs of different classes of society—the rich upper class, the less well-to-do middle class, and the poor. And these three classes varied, according to whether one has



FIG. 7.—Modern writing table, its flushed surface veneered with figured walnut and zebra wood on a carcase of laminated board.

London in mind, the provinces or the countryside. All these grades meant a different quality of craftsmanship. And apart from this, there was a process towards refinement of craftsmanship which was continually taking place from early to modern times.

The feeling of æsthetic pleasure aroused at the sight of old English furniture is due, to some extent at least, to the harmony of the parts of such furniture. Its design was contemporary with and original to its period in history. It was also the product, or result, of the correct application of the principles of the craft of furniture-making at that time. The demands, brought about by changes in social habits, new forms of material, different ways of construction and different economic methods of production, differed in each succeeding age, and it is because traditional furniture acknowledges all these changes that its design possesses an æsthetic significance. This was forgotten by our Victorian ancestors; their creative powers having gone into industry, they were the first to reproduce the past styles—Gothic, Elizabethan, French, Italian—for their architecture and furniture. Living in a pseudo-Elizabethan villa, with sham Elizabethan furniture, satisfied the “romantic”

yearning of our great grandparents, wishing to counteract the industrial dullness of their own creation.

Before considering modern furniture, it should be remembered that the old system of furniture-making was designed to meet the demands of a population which did not, even at the end of the eighteenth century, exceed six or seven millions. Production by hand-craftsmanship was sufficient to meet this demand. To-day one has to provide furniture for a population of forty-five millions, and the modern system which worked adequately before the war, achieved its aim by methods of standardisation, mass-production, machine processes, and the elimination of uneconomic handiwork.

Plywood and laminated board are two valuable materials for the making of modern furniture, for they overcome the natural shrinkage and twisting to which wood is liable. It is essential, therefore, that furniture should benefit both structurally and economically by their use. And it is also essential, because these materials play a part in the construction of the furniture, that they play a part in the design.

The manufacturer of the pre-war period, although he used all the modern methods which permitted him to produce furniture at a saleable price, ignored the important principle of design being the natural outcome of material and construction. Nor did he permit the design to make any acknowledgment to the current English idiom. On the contrary, he dictated the design of his products according to his own idea of what the public liked. Consequently, he made dining-room suites which he called "Jacobean" and "Queen Anne", and bedroom suites which he termed "modernistic". In this cheap, mass-produced furniture, the ornament often has the objectionable character of masquerading as handiwork, whereas actually it has been either stamped or fretted by machine. Such furniture was, first and last, a commercial product, in which quality and design have been made entirely dependent on the controlling factor—sales. This type of mass-produced furniture represented the bulk of the output of pre-war industry.

There was, however, one other grade which was not mass-produced, for a great amount of the work was done by hand, and unlike the mass-produced variety, its cost was high, and therefore its sale limited. Its design was based on the traditional styles, "Chippendale", "Sheraton", and "Regency", and therefore as a contribution to modern English furniture, its value was nil. Its hand-made cabinet-work and carving would not exist in the present age, unless there were wealthy, not too discriminating, people to support its sale—not unlike the sale of out-of-season strawberries.

An illuminating example of an uneconomic use of carving is provided, at this moment, by the new House of Commons. The *Times* of 31st January informed us that there are "thousands of pounds of hand-carving" being carried out in the ornamentation of the panelling and fittings. The contracting firm had difficulty to find the many carvers necessary for the work, but fortunately "some of the dear old boys" came out of retirement.

However, there was one bright spot in the pre-war furniture trade, the work of smaller manufacturers, who specialised in producing furniture by modern methods, and by use of modern materials (chiefly laminated board) which resulted in well proportioned, cleanly designed furniture in the contemporary idiom. If the

furniture for the masses could be made to possess a similar contemporary character, then English furniture design, sunk now to so low a level, might once again rise. Hand-craftsmanship, however, would take very little part in its production. There is no place for it in the modern furniture factory. In this age it belongs to specialists such as the maker of automatic tools, the maker of moulds for mass-production of plastic and other wares; also the tool setter of an automatic machine, for these are highly skilled jobs, similar in every way to fine craftsmanship. To have a revival of the handicraft system in the William Morris manner is not possible, economically, in the world of to-day. The products, unless they were of a type of a village industry, would have to be heavily subsidised to bring down the cost, and also, if the demand was great, as it very well could be in an age of large populations, it would be very difficult to meet.

But apart from all this, there is the question of what style the modern handicraftsman would express himself in. There would always be the danger that he would go back to the past for his designs, which would be a retrograde step, for design, as I have emphasised, is something inseparable from contemporary life.

DISCUSSION

THE CHAIRMAN: Mr. Symonds has taken us on a very comprehensive historical tour of the craft of furniture making in England, and has brought us up to the manifold frustrations and, perhaps I should say, the practical and applied obscurantism of the present day so far as design is concerned. He omitted, perhaps wisely, to make any reference to that form of rationing in furniture which goes by the name of utility furniture; but, rationed and restricted though it is, it has done a certain amount of cleaning up of ideas, and it may have a lasting effect, or at least an effect which will last for a long time, on furniture design in this country. What that effect is likely to be I do not attempt to prophesy. It may produce a reaction which may be more than Victorian in its elaboration, a reaction against enforced austerity. On the other hand, it may implant a feeling for form, for good proportion and for untroubled surfaces in furniture. I envy Mr. Symonds his capacity for compressing into so short a space of time such an informative historical essay.

MR. COSMO CLARK: Does not Mr. Symonds think that this country could support a great many more individual designers and makers of furniture at the present time than in fact it does? I understand that there are about 120 well-known and fine furniture makers in Denmark, who are kept busy by a population of four and a-half million.

MR. SYMONDS: The difficulty is that we have a population not of four and a-half million but of forty-five million, and to satisfy so large a demand brings in the economic side of furniture making. The only way for so much furniture to be made at a price which people can afford to pay, is to mass-produce and have it machine-made, and time therefore cannot be afforded for hand-craftsmanship. There can be small isolated pockets of craftsmen at work, but their products can be bought only by people who are wealthy and who, in other words, subsidise the craftsmen. I think that the craftsman of the old days has gone. We want the new craftsman of to-day, or their skill in the quality and taste of design and the use of veneer. I do not think that carving will ever come back; it ought not to do so, for it takes time and is uneconomic in the modern world, and apart from this the beauty of figured wood is sufficient to give furniture a great decorative value.

MR. J. W. WATERER: I am glad that Mr. Symonds differentiated between craftsmanship and artistry. I think we can go a little further and differentiate between craftsmanship and ordinary handwork about which there is still some measure of confusion, because by no means all handwork in the belauded Middle Ages was good, economic or enjoyable

to the workman. The craftsman, as I view him, was the skilled executant, although not always the creative artist, and the punitive operations of the guilds, to which Mr. Symonds referred, make it quite clear that the struggle to keep bad work in check was a very real one. The really skilled craftsman—that is the man with a high degree of manipulative skill and a deep interest in his job and who often produced lovely and expensive things—never did and never could supply the needs of the whole population, as is sometimes asserted. He did not, I think, supply a substantially larger proportion of the whole population than he does to-day, but to a large extent his gifts have now been diverted into other channels and to new forms of skill, such as scientific instrument making and certain forms of engineering, also the production of archetypes and prototypes, and the actual tools for mass production by means of which it should be possible for well-designed goods to be available to a far larger number of people than in earlier times. More than ever, to evolve the right styles we need the inspiration of the creative artist, always a rare bird, whose influence through the ages has seeped through each trade and affected its products.

From the earliest times man has been busy evolving tools to lighten his labour and therefore to increase quantity and reduce cost. I accept the view that even the elaborate machine tool of to-day is the logical development of the flint scraper or the potter's wheel, still to be regarded as the servant and not the master of man. I consider that the craftsman still has a vital part to play and that we should make the utmost use of the vast opportunities which are offered to us to-day and not look nostalgically backwards at outmoded styles and methods which have no organic relation with our contemporary way of life. As Mr. Symonds has said, it is inevitable that certain forms of craftsmanship will disappear or fade largely out of the picture, but that is no reason why we should not still have craftsmen, and I believe that the craftsman will still have a very important part to play. I do not believe that craftsmanship is dead or even dying.

THE CHAIRMAN: I must thank Mr. Waterer for his very illuminating sidelight and also for his tribute (perhaps a rather courageous tribute to pay in this century of the common man) to the uncommon man, who, of course, is the only sort of man that ever matters.

MR. SYMONDS: I think that craftsmanship in certain other forms of manufacture, for example, leather work, in which Mr. Waterer is interested, may exist to a greater extent, but in woodwork it is extremely difficult to introduce craftsmanship, particularly in furniture. For instance, in the case of a carver, what style is he going to work in? What idiom will he use? He cannot carve in the style of Grinling Gibbons or Chippendale; he must do his work in relation to to-day, and this, I think, illustrates the great stumbling-block to utilising craftsmanship in the modern furniture trade.

THE CHAIRMAN: It is now my pleasant duty to propose a vote of thanks to the author of the paper. I think it would be stupid to use the ordinary conventional words about the instructive, entertaining and pleasurable time that we have had. Mr. Symonds very seldom produces more than three sentences without starting a train of thought, and a train of thought which leads one on to exploring, as the politicians would say, some avenues, but avenues much more exciting than those in which politicians find themselves wandering about. Mr. Symonds, especially in his books, has a way of opening up fresh thoughts about his subject, which makes one say: "Why, I never thought of that particular aspect of it before!"

In listening to Mr. Symonds and looking at the apposite slides which accompanied his well chosen words, I started to reconsider what little I know about furniture, and I thought: "There are a good many more things that I ought to explore and a good many more things that I ought to look up; I must find out more about this and that particular aspects of the subject". In fact, Mr. Symonds is a superb mind-opener on the subject of furniture and furniture design, and it gives me the greatest pleasure to propose a vote of thanks to him for his paper.

The vote of thanks was accorded with acclamation, and after a vote of thanks had been accorded the Chairman, the meeting terminated.

GENERAL NOTE

OUTDOOR SCULPTURE AND PAINTING.—Two exhibitions bravely sponsored by the London County Council should convince visitors from the Continent that our public authorities can, on occasion, be as enterprising and imaginative as any *Syndicat d'Initiative*. The more important of these—organised in association with the Arts Council—is the display of modern European sculpture in an inner garden of Battersea Park, where the works will remain on view until September 13th. The success of the venture depends, of course, on two uncertain factors—the weather and the public's response. Up to the present the latter has been distinctly more encouraging, but time enough remains for the weather to relent so that Londoners may enjoy to the full the opportunity of studying a number of masterpieces in an ideal setting.

Forty-three works (lent by the sculptors, and in a few cases by public galleries) have been assembled to provide an introduction to European sculpture of the last fifty years. Rodin and Maillol are represented by three works each, Epstein and Henry Moore each by two powerful groups or figures, and these sculptures are the backbone of a wisely-chosen collection.

Moore's "Three Standing Figures", which a colleague goes so far as to name as "the greatest single work in sculpture or painting to be accomplished by an English artist in the present century", is unquestionably the most controversial, as it is also the most imaginative work in the exhibition. The impersonal nature of the sculptor's reclining figures repels many people, I am well aware; but these standing figures, carved in Darley Dale stone and grouped like some ageless cromlech, must surely move anyone who has ever marvelled at a primeval form of nature. You may, you almost certainly will if your ideal is the Greek sculptural forms, consider these female figures uncouth and misshapen; but if you linger below the towering beeches where they are placed, and try to enter into their mysterious communion, their compelling fascination will surely grow on you.

Elsewhere in this beautiful lakeside garden you may gaze up at Rodin's bronze of St. John the Baptist on the summit of a knoll, and admire Charles Wheeler's graceful "Spring" in green bronze dancing by the water's edge.

The other welcome outdoor experiment was the exhibition of paintings in the Victoria Embankment gardens, designed to help little-known artists, which lately closed after fifteen days of boisterous weather. The public, it appears from conversations I had with the bearded and sandalled artists who stood expectantly beside their works—the public was more curious than acquisitive; but then a show of this nature, familiar enough in Paris in the shadow of the Madeleine, is an innovation in London, and not until it becomes a recognised annual event are sales likely to be brisk.

But it was a colourful scene—the long line of multi-radiant pictures hung on screens and sheltered by awnings like the open lids of Parisian book-boxes, the hirsute Bohemians pinning talc over their water-colours or adding some finishing touches to an oil, the idle crowds sauntering along the broad leafy avenue which extends from the Villiers street garden to Savoy Street—a colourful scene which I hope will return next summer.

If it does, I shall look forward to renewing acquaintance with Ulrica Forbes' delicate sanguine drawings, some admirable paintings by E. A. Holloway, and the amusing variety of styles from Cubist to Academic or (perhaps more truthfully) ex-Academic.

N. A. D. WALLIS.

NOTES ON BOOKS

OUR RIVERS. By J. W. Kempster. Oxford University Press, 1948. 25s.

In the rivers and streams of our land we had indeed a goodly heritage, but it has been sadly marred by the hand of man. Many rivers have been grossly polluted, not only by imperfectly treated sewage and trade effluents, but also by crude sewage.

The damage which has been done is described very vividly in this book, in particular the heavy mortality among fish, and in some cases the disappearance of fish life altogether.

The loss to the country is great, especially in the case of those rivers which formerly contained substantial numbers of salmon and salmon trout.

There are most interesting chapters on the life history of salmon and sea trout and with regard to their enemies. There is also a full summary of the legislation which has been enacted from time to time for the preservation of rivers and the prevention of pollution.

In England, fewer early fishing laws were enacted than in Scotland, amongst the first English Statutes being that of 1225, concerning weirs in the Thames and Medway, in the reign of Henry III., followed by an Act in 1285 in the reign of Edward I., prescribing annual close seasons for salmon in various English rivers. Domesday Book has many references to fisheries existing at the date of that survey.

The remedy for the present deplorable condition of many of our rivers is fully discussed and much valuable information is given with regard to the efforts which have been made towards their improvement, commencing with the Rivers Pollution Prevention Acts of 1876 and 1893. In a few districts these Acts have had good results, but on the whole, for various reasons, little progress has been made, although some assistance has been given by the Salmon and Freshwater Fisheries Act, 1923. The question has been fully considered by various advisory bodies, the most important of which was the Central Advisory Water Committee, which was appointed by the Ministry of Health in 1937, after consulting other Ministerial Departments, and is generally known as the Milne Committee, as it was ably presided over by Field Marshal Lord Milne. This committee submitted several valuable reports, one of which resulted in the Water Act, 1945. In the third of their reports, which is summarised in the Appendices, they recommended the co-ordination of the various river interests, and the constitution of new bodies with comprehensive duties for rivers or groups of rivers, who would take over the functions of bodies responsible for land drainage, fisheries and the prevention of pollution. This recommendation is embodied in The River Boards Bill, which has just received the Royal Assent.

Fishery law and the right of fishing are also dealt with and there are a number of effective illustrations.

Altogether the book gives a graphic picture of our rivers at the present day. It contains much valuable information in a concise form and is of great interest not only to fishermen, but also to those who have at heart the improvement of our rivers and streams and the removal of the blots which at present exist.

S. R. HOBDAY.

STUART AND GEORGIAN CHURCHES. By Marcus Whiffen. B. T. Batsford. 18s.

This well written and concise treatise is an account of a branch of architecture which has hitherto been neglected. It is one which will appeal to all serious students.

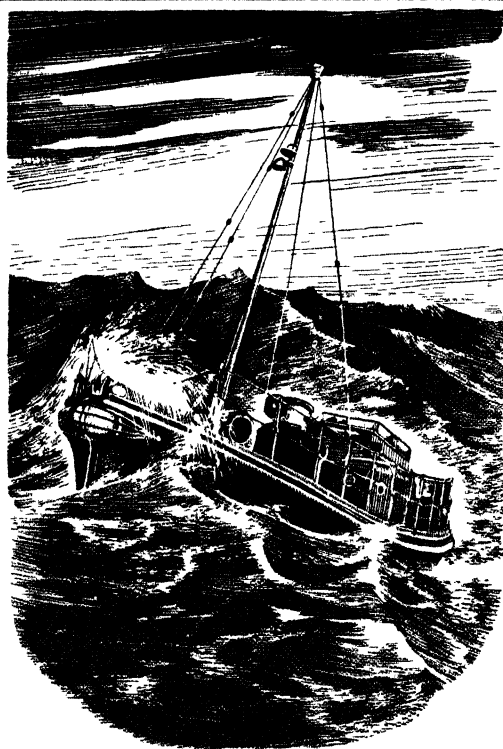
The author deals mainly with the transition from church building at the close of the reign of James the First to that of Wren; but he shows the genesis of the eighteenth-century manner, with its interludes of Rococco and Romanticism. The interest is *ab intra* and illuminating by reason of the discoveries. The author proves that the arts in the provinces followed a similar movement to that which flourished in London. Even if the results were less academic and not so heroic the addition to the English heritage was great. The fluctuations of religion can be said to have evoked an architectural expression in accordance with the tempo of the age. The conditions encouraged the rise of local celebrities and demonstrated the truth that art is dependent on the moral integrity of a nation. The men who designed country churches in the seventeenth and eighteenth centuries had no confused ideas of the character a church should have. Thus, whether the building was a small affair like Groombridge, 1623, or the church of St. John's, Leeds, 1632, the impress of medieval tradition was tempered with decorative innovations of Renaissance type. So far there was no great departure from precedent. After the Restoration of Charles the Second fashion favoured the adoption of a precise classical idiom as can be seen at Wilton in Buckinghamshire, and Ignestry in Staffordshire. And

so the advance was made to the manner of All Saints, Northampton; St. George's, Gt. Yarmouth, and the cathedral at Birmingham by Archer.

The influence exercised by that great master, James Gibbs, through his churches and by the illustrations in his book, is explained very fully. Early Georgian merges quite easily into the Adam period when Mistley, in Essex, and All Saints, Newcastle, 1780-96, became famous. Such were the changes wrought in slow time. Very little comparison can be made between the early and late examples in actual resemblances. In spirit the designs show continuity, in detail and variation of theme they are unique. During the last quarter of the eighteenth century, Greek and Roman antiquity was studied and details were applied with more subtlety; the Palladian basis being continued for planning and massing. At this juncture, Stuart and Revett built the charming temple" at Ayot St. Lawrence, in Hertfordshire. Wanstead in Essex, and Nuncham Courtenay in Oxfordshire, on the other hand, expressed the polarity of the classical theme. Mr. Whiffen is particularly happy in his account of eighteenth century interest in Gothic, which includes Tetbury in Gloucestershire by Francis Hiorn; Theale by Garbutt and St. Peter's Brighton, by Sir Charles Barry.

Within the limits of a review it is not possible to do justice to all the churches described by the author; neither can it be expected that every known church of any obscure phase of church building should have been the object of study. There are, however, a few omissions, notably the Garrison Church at Berwick-on-Tweed; the Chapels in the Royal Dockyards; and those charming works in the former Diocese of Lincoln ascribed to Hawksmoor. It can be prophesied that Mr. Whiffen's book will run into many editions.

A. E. RICHARDSON.



LIFE-BOAT FACTS

LIFE-BOAT MEN

All Life-boat men are volunteers except the motor mechanics. All are rewarded every time they answer a call. Total yearly payments to the men are nearly £100,000. The Life-boat Service is supported entirely by voluntary contributions. Send your contribution however small.

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4774

FRIDAY, JULY 30, 1948

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ELECTION OF CHAIRMAN OF COUNCIL

At their meeting on Monday, 12th July, the Council unanimously re-elected Sir Harry Lindsay, K.C.I.E., C.B.E., as Chairman.

HOURS OF THE SOCIETY'S MEETINGS

The Council have decided that during the forthcoming session Ordinary meetings and meetings of the Dominions and Colonies and of the India, Pakistan and Burma Sections should, as in the last session, commence at 2.30 p.m. Cantor Lectures will commence at 8 o'clock. This latter arrangement was made as an experiment for one session, to meet a suggestion put forward at the Annual General Meeting.

MEETING OF COUNCIL

A meeting of Council was held on Monday, July 12th, 1948. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Mr. F. H. Andrews; Mr. A. C. Bossom; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Edward Crowe; Sir Thomas Dunlop; Mr. Peter Le Neve Foster; Mr. John Gloag; Mr. E. W. Goodale; Dame Caroline Haslett; Dr. R. W. Holland; Sir Henry McMahon; Mr. G. K. Menzies; Mr. F. A. Mercer; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. William Will; Mr. J. C. Wilson and Sir John Woodhead; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society:

Bates, John Edward, Lazenby, Yorks.
Broke-Smith, Brigadier Philip W. L., C.I.E., D.S.O., O.B.E., Lindfield, Sussex.
Broome, Donald Charles, Ewell, Surrey.
Campbell, Norman, Durban, South Africa.
Clarke, Thomas Flowerday, South Croydon, Surrey.
Cook, Leonard Oliver, Kingston-on-Thames, Surrey.
Corringham, George Frank, Bournemouth, Hampshire.
de Freitas, Geoffrey Stanley, M.P., Loughton, Essex.
Egan, Harold, Barrow-in-Furness, Lancs.
Emeléus, Professor Harry Julius, M.A., D.Sc., F.R.S., Cambridge.
Espley, Arthur James, O.B.E., J.P., Hellingly, Sussex.
Etchells, Frederick, Wantage, Berks.
Eurich, Richard Ernst, A.R.A., Southampton, Hants.
Federn, Roland, Edgware, Middlesex.

Gerhold, Miss Sheila, London.
Glusker, Dr. David Solomon, Mexico City, Mexico.
Grieve, Dr. John William, M.A., Fleetwood, Lancs.
Halbritter, Sidney Constantin, London.
Hallett, Edward Stanley, M.A., Johannesburg, South Africa.
Harris, Ralph Ashley, M.A., Auckland, New Zealand.
Hazelby, Harold Whittle, Richmond, Surrey.
Jarman, Reginald Gatenby, Stockport, Cheshire.
Jerichow, Herbert Peter Andreas, O.B.E., Hellerup, Denmark.
Julian, Alastair Bell, Omdurman, Sudan.
Maddox, Alexander Monteath, M.B.E., M.A., Chester.
Maitland, Donald James Dundas, London.
Matthew, Professor Thomas Urquhart, B.Sc., Ph.D., Birmingham.
Mitchell, Harold Ewart, London.
Mogg, William David John, Loughborough, Leics.
Morris, Henry Roland, Bournemouth, Hants.
Munro, Reginald James, B.Sc., Finaghy, Belfast.
Murray, Miss Margaret McEwan, Toronto, Canada.
Northumberland, His Grace the Duke of, Alnwick, Northumberland.
Norton-Griffiths, Sir Peter, Bt., Hamburg, Germany.
Olivier, Sir Laurence Kerr, London.
Parker, Herbert, Llanferres, Flintshire.
Pumphrey, William Idwal, Flint, N. Wales.
Roosval, Professor Johnny August Emanuel, Ph.D., Gotland, Sweden.
Russell, Gyrth, Doncaster.
Southey, Jack, Sevenoaks, Kent.
Thirtle, John Lomer, Uxbridge, Middlesex.
Thomas, Frank Charles, M.A., M.Sc., Ph.D., Leamington Spa, Warwicks.
Tingate, Cyril John, J.P., Willoughby, Australia.
Tizzard, Reginald Stanley, Caterham, Surrey.
Toba, John, London.
van Puyvelde, Professor Leo, Ph.D., D.Litt., Brussels, Belgium.
Wade, Arthur Cecil, London.
Williams, Wheeler, M.A., New York, U.S.A.
Williams-Thomas, Hubert Silvers, Broome, Worcs.
Wood, Thomas Thorne, Strand, South Africa.
Zinn, William Victor, B.Sc., London.

The following candidates were duly elected Associates of the Society:

Curtis, Robert Ernest, London.
MacDonald, Miss Anne Belinda Gwenllian, Reading, Berks.

The standing committees were reappointed for the new Session.

Silver Medals were awarded for Papers read during the past Session (see p. 539).

Further consideration was given to the hours of the Society's meetings during the forthcoming Session (see p. 537).

It was reported that the number of entries for the July series of examinations was 45,845, making a total of 128,579 for the year as compared with 87,992 last year.

A quantity of formal and financial business was also transacted.

AWARD OF SILVER MEDALS TO LECTURERS

The Council have awarded silver medals for the Session 1947-48 to the following lecturers:

For Papers read at Ordinary Meetings

- John Farleigh, A.R.E., "The Crafts—Their Past, Present and Future".
Sir Ernest T. Fisk, "The Development of Sound Recording and Reproduction".
Lieut.-Colonel L. Urwick, O.B.E., M.C., M.A., "Education for Management".
C. Butement, "Three-Dimensional Photography".
Professor H. G. Champion, C.I.E., M.A., "Afforestation as a World Problem".
Henry S. Horsman, M.I.MECH.E., A.M.I.E.E., "District Heating".
Cosmo Clark, M.C., "Craftsmanship in the Countryside".

For Papers read before the India, Pakistan and Burma Section

- Rev. G. Appleton, M.B.E., M.A., "The Burmese Viewpoint".
Sir Frederick E. James, O.B.E., "Sixty Years' Industrial Development in India".

For Papers read before the Dominions and Colonies Section

- E. Marsden, C.M.G., C.B.E., M.C., D.Sc., F.R.S., "Co-ordination of Research in the Pacific".
A. J. Wakefield, C.M.G., B.Sc., "The East African Ground Nuts Scheme".
C. B. Symes, O.B.E., "Control of Insect-borne Diseases in the Colonies; Some Recent Progress and Future Prospects".
A. T. Newbould, C.M.G., "Reconstruction in Malaya".

COLLOIDS

By ERIC K. RIDEAL, M.B.E., D.Sc., F.R.S.

*Fullerian Professor of Chemistry, and Director of Davy Faraday Research Laboratory,
Royal Institution*

CANTOR LECTURES

LECTURE I.—*Delivered 1st March, 1948*

When Professor Gibson asked whether I would give a course of three lectures on Colloids, I explained to him that I thought the matter was rather outside the range of such a short course. As most of you know, there are a large number of textbooks published on the subject, and one finds it difficult to compress such a large subject into three lectures. At the same time, it did occur to me that there were certain points in connection with the general treatment of colloids that might be worth considering, and I thought that in this course we might look at those few points and examine the present position.

The first thing I think worth noting is that in this City of London the first President of the Chemical Society—Graham—to whom we are indebted for the word "colloids", had a very definite idea of what he understood by the term colloids from

the Greek "glue", namely, materials that diffuse rather slowly. That idea persisted for a long time, but somewhere about 40 years ago there was a great extension of that view and we are indebted to two people for bringing rather a new concept into what we understand by the term "colloid"—one, the German, W. Ostwald, and the other, Sir William Hardy in this country. The concept they introduced was what has been called the "forgotten dimension", namely the "interphase", and those systems which have interphases are colloids. This is a much more extensive definition than the original one of the non-diffusivity of particulate matter.

We can enumerate the different types of colloids we might expect if we regard them as systems which have large extended interphases. We might take the simplest type where we start with the gases. Gases are completely miscible with one another and cannot form an interphase, but we can have a gas-liquid interphase. With a gas-liquid interphase there are two types: we may have a liquid dispersed in a gas or a gas in a liquid. Thus one complete and extensive colloidal system gives two types of colloid. If we consider liquids dispersed in gases, those are the mists, and they have a certain amount of interest both from the academic and also from the technological point of view. I think a stimulus was given to the study of mists by considering the dispersion of toxic materials in the treatment of plants with fungicides, on account of which considerations of the stability and formation of mists have become extremely important. If we take the gas dispersed in the liquid, we obtain foams, and here also the science of foams has been badly neglected, and the theory of W. Gibbs has not been properly examined. Interest in foams in putting out fires, etc., has stimulated research, and we have recently noted a number of papers in the Faraday Society's Transactions on the theory and stability of foams; in addition, the enquiry by the Department of Scientific and Industrial Research has proved fruitful. Secondly, we have the gas-solid system. Again, there are two types—the solid dispersed in the gas and the gas dispersed in the solid. Solids dispersed in gases are dusts, and while metallurgists and meteorologists have been interested in them little is known of dusts and their formation, although Professor Whitlaw Gray's work on smoke provides us with information on the stability of these systems. With regard to the gasses dispersed in solids, *i.e.*, frozen or solid foams, the only examples one can show are pumice stone and various "expanded" materials, either natural ones like balata wood and rubber or synthetic polymers.

More important are the liquids, and here we have emulsions which can undergo inversion. The process of inversion in emulsions is a well-known phenomenon and we know a great deal about them.

In solid-liquid systems we can have liquids dispersed in solids or the solids dispersed in liquids. Solids dispersed in liquids are suspensions which have been the subject of many enquiries. As to the liquid dispersed in the solid, very few examples are known. If you go into caves where there are stalactites and stalagmites you may have noticed that some of them contain liquid, and on examination you will find a saturated solution of the calcium carbonate dispersed in the crystal itself. It is also noted with potassium inclusions in potassium chloride where the colour of potassium chloride is due to the inclusions of the potassium.

Lastly, there is the solid-solid system. These solid suspensions, like ruby glass

for example, are things really worth examination. This country was famous about 300 years ago for its coloured glasses, and one would like some one to take up the subject of these coloured glasses in some detail because modern glasses when compared with some of the older ones, such, for instance, as we have in some of our churches, are by no means so brilliant in colour.

We might glance at some of the problems in connection with the formation of suspensions. The method by which the suspensions can be formed are clearly two-fold. We can either build up a solid phase in a liquid and get the dispersed solid phase in that way, or we can take a massive solid phase and disperse it by electrical, mechanical or chemical means. Both these methods have been used, and there are certain problems connected with them. Let us look first of all at the method of condensation. This involves certain principles. We produce a super-saturated solution and we have to form in that super-saturated solution certain nuclei. These have got to grow to a certain size, then they must stop growing and the particles, or crystals, must then be rendered stable. We thus obtain a colloidal solution. It involves two quite separate operations—the formation of a nucleus and the growth of that nucleus to a certain size and then allowing that grown system to stop at the appropriate moment. Only recently have people tried to separate these two factors and understand what happens. Suppose we have an extremely dilute solution slightly super-saturated, then the molecules of the solute are a long way apart. They must come together and form a nucleus. What is the size of the nucleus, and how many will there be in the solution? It is clear that if the solution is very dilute and only slightly super-saturated, the number of nuclei in the solution will be small. In other words, they will be formed a long distance from one another. If the solution is stronger, then the nuclei will be closer together and when they grow they may even form a crystalline network. Then again, how crystalline are they? Do the nuclei grow as perfect crystals and what are the conditions of their crystalline form? An attempt to embrace both these factors was due to von Weimarn who introduced the term “dispersion coefficient”. According to von Weimarn, in order to produce a system in a colloidal form you must have a high dispersion coefficient. That depends on the potential super-saturation. If we take a solution and make it super-saturated, the tendency to crystal growth will increase. If we call the concentration “ c ” and the solubility “ s ”, then the dispersion coefficient is the actual super-saturation over the saturation amount multiplied by the viscosity. $D = \frac{c-s}{s} \eta$. If the dispersion coefficient is great we can expect the material to appear in colloidal form.

If we mix extremely dilute solutions of barium thiocyanate with sodium sulphate, such as $\frac{M}{100}$ or $\frac{M}{1000}$, then the dispersion coefficient is rather small, say, 3, 4 or 5, and we shall probably not see any crystals appear at all, but if we wait a sufficiently long time, then a few crystals will start to grow. Some of the early experiments showed that after a long time—in one case several years—a small dispersion coefficient produced crystal growth in the solution. If you increase the dispersion coefficient, then the crystals grow after several months, and so on. If you get up to the next range, $\frac{M}{10}$, you will find a lot of fine crystals precipitated in a very short time. If we increase

the dispersion coefficient up to about 100, the sulphate appears in quite a different and colloidal form. With the 5-molar solution barium sulphate having a coefficient of about 80,000, we obtain again a different form, a "gel". Barium sulphate can thus be prepared in different forms. Again in the preparation of gold, we note in the reduction of gold chloride by means of tannic acid, that the principles of von Weimarn are again fulfilled. The actual solubility of gold itself is extremely small, so that very small concentrations allow one to prepare a potentially super-saturated solution. The problems involved are twofold: the formation of a nucleus and the growth of a nucleus when it is formed. The nucleus must be formed by molecules coming together, and we ask how many come together for a nucleus to be formed, and how long do they persist? The gold solution is reduced by means of the tannic acid, and the crystals appear. Consider this nucleus in detail, because it is an important factor. If the molecules come together to form a very minute crystal the problem arises, can that small crystal be in equilibrium with the saturated solution or must the latter be super-saturated? The early work on grinding large crystals into small crystals revealed that the latter possessed a higher vapour pressure and solubility. The small as well as the large crystals are bounded by similar planes and edges. The surface energies of all facets and edges are not equal and, in addition, the crystal lattice energy can suffer appreciable changes in potential energy by distortion under pressure or shear. Such extra potential energy in the crystal will naturally alter its solubility. So one must regard a number of these experiments, that have been made to try and prove that size alone is the important factor, with a critical eye.

The growth rate of these nuclei depends on the degree of super-saturation. If we take a tube containing a super-saturated solution and attempt to measure the rate of crystallisation along the tube, we discover an interesting point. If you plot the rate against the lowering of the temperature or the increase of super-saturation you obtain a curve with an inflexion maximum. The rate increases as the temperature is lowered, and then it begins to decrease. At very low temperatures you get into the glassy state where the rate of crystallisation is zero. There are clearly two factors operative in these rate processes, namely, the mobility of the molecules and their arrangement in the crystal lattice. In respect to mobility we note that if we have a crystal at one end of the tube and imagine a molecule coming to that little crystal, then the more viscous the medium the slower the rate of approach of the molecule to the crystal. If we perform the experiment in glycerine instead of water, it would take 100 times as long. What happens when the molecule gets to the crystal? If the latter consists of sodium chloride, a chlorine ion can become attached to a crystal sodium ion readily because strong electric forces are operating. Again a substance like alcohol has a dipole and we would imagine that two molecules would stick together by means of their dipoles rather than by any other way. If we take a non-polar substance such as octane we can see that only the weak dispersive forces are operating.

If the little crystal of barium sulphate is really going to be a stable system it is clear that the atoms or ions must fit into the lattice. When an atom or ion approaches the surface it must move about on the surface until it finds its appropriate place and then it must be bound into the crystal surface. All that takes time, so it is clear

that if the rate at which the molecules approach the crystal is very great, the rate of arrival may be so great that they will not have time to fit into the lattice. If this is a crystalline ionic lattice, where the forces are very great, then we can allow the ions to come at high speed because the forces of crystallisation are so strong. If, however, the forces are very weak, then we must bring these molecules very slowly to the little crystal in order that they may have time to move about under very weak fields that operate on the crystal surface. Thus the idea of von Weimarn needs a considerable extension in concept, because the degree of super-saturation necessary and the viscosity are determined not by the rough figures of solubility, but also by the forces that are operative in the crystal itself. If the lattice energy of the crystal is very high, then we can afford to bring the molecules up to the crystal at a relatively high speed, but if the crystal energy is very small, we can only permit a slow growth of the small crystallites.

That is one of the important factors to be considered. Another is the mobility over the crystal surface. What form do we require to prepare our colloid in? In the case of barium sulphate we can get it into gelatinous form, which is evidence that the gel must consist of extremely fine interlacing crystals of barium sulphate which enclose within their pores a quantity of liquid, that is a saturated solution of barium sulphate.

So much for some of the general principles involved in methods of condensation. We must now consider the lattice forces. We know a little about the lattice forces—the ionic, the dipole and the dispersive. We can develop equations which give a form of curve of growth of a crystal assuming that the growth is conditioned by these two factors, namely, the mobility of the molecule at the surface and the rate at which the molecule can fit into its lattice. I have here two examples of super-saturated solutions. One is a super-saturated solution of hypo and the other of sodium acetate. We put into the hypo a crystal of hypo and into the sodium acetate a few crystals of sodium acetate. We note the crystals starting to grow alone the tube. They grow at measurable speeds, and from the influence of temperature on the rate of this growth we can reach some interesting conclusions. At the advancing zone the liquid is crystallising, and consequently there is a latent heat of fusion which is being liberated so that the temperature at the advancing zone is a little different from that behind and that in front. The rate of growth may be limited by the rate at which the heat can be liberated, because if the temperature gets too high the solution is no longer so super-saturated as when the temperature were lower. Alternatively, the rate may be controlled by the rate of crystal growth itself. This rate of growth is a slow one. It mimics a chemical action. The molecule on the surface must move about on the surface to find its position, and that requires an energy of activation.

These represent some of the problems connected with the formation of suspensions by the method of condensation.

We may now examine the method of dispersion. The usual method is the mechanical method, and there again a lot of problems are involved, such as whether compression or shear is the right method of dispersion of a solid, and what type of machine should one employ in order to make good colloid. I want, however, to mention one or two facts in connection with the method of dispersion to show the general principles involved in the dispersion by electrical means. If we mix a solution of silver

nitrate and potassium chloride we obtain a precipitate silver chloride. At the point where the silver ions and the chlorine ions are equally absorbed on the silver chloride the precipitated silver chloride becomes electrically neutral. There is neither an excess of silver ions nor of chloride ions. If, on the other hand, we have a slight excess of silver ions or of chlorine ions, then the small crystals will have absorbed on them an excess of silver or chlorine, and so we shall get the particle positively or negatively charged. If it is either a positive charge or a negative charge the particles repel one another and we obtain a positive or negative suspension. The stability of these suspensions is due to the electric charge. We might imagine that the silver chloride crystal undergoes surface ionisation, and it may lose silver or alternatively chlorine ions. It is believed by some that the source of charge on all colloid particles comes from this process of surface ionisation. That is quite an easy thing to understand where you have a system of silver chloride, because silver chloride can ionise, but it is not so simple to understand when you come to deal with colloidal gold. How does it acquire its charge? It must be charged to be stable. That is one of the problems which Professor Kruyt and his school in Holland have devoted their attention to for the last 25 years. I think he would admit that we do not know all the curious electrical properties of silver halide suspensions. We do, however, know that in the case of colloidal metals that part of the charge, or very frequently the charge itself, is produced by some constituent which is not the metal. In the case of platinum you can prepare it by sparking platinum under water, and it is much more stable in the presence of a trace of alkali. This is an electrical method of dispersion. Why does the small quantity of alkali make it more stable? We find that the platinum sol consists essentially of a number of atoms of platinum, arranged in some form of a crystal structure; but in addition to that each particle contains a certain number of molecules of aquaplatinic acid, which is a strong acid and can ionise. So the platinum sol acquires a negative charge owing to the ionisation of the aquaplatinic acid contained therein. In the same way the gold acquires its charge because it contains a small quantity of ionisable auric acid. People who follow Pauli's school believe that all such charges are due to the surface ionisation of an ionogenic material. That is not the whole story as Professor Kruyt has shown, for we know we can get adsorption of ions as well. Precipitation experiments on adding different ions to a colloidal solution reveal limiting concentrations to effect precipitation. This must be due to the interaction of the ions with the colloid, and it is clear from a consideration of organic ions that other forces in addition to electrostatic forces are involved. We must also consider the possibilities of the adsorption of ions from the solution stabilising the colloid particle.

The last point in connection with the ionic adsorption or ionisation is the orientation or structure of the electrical layer. We can have ions adsorbed close to the surface, and we can have ions which are held at some distance away. A great deal of attention has been paid to the distribution of ions some distance away from the colloidal particle to which distribution, the so-called Gouy layer, the main electrical properties are due. Inside this zone of electrolyte there are ions which are not free, but are held very close to the surface, and it is the composition of this phase, the Helmholtz layer, which is so uncertain at the present time. We have no really reliable method of determining the concentration of ions very close to the surface.

These are some of the problems connected with the suspensions and the method of making suspensions by means of electrical dispersion methods. The other type of system is where we are dealing with methods of condensation of the von Weimarn type. One can find a similar type of phenomenon taking place in connection with the formation of another type of colloidal suspension, the ionic micelle. As you know Dr. Bury first showed how the long chains of the salts of fatty acids, could stick together and eventually form quite a big particle. Two factors are involved in this—the length of the chain and the nature of the head. If the head is an ionised one, we obtain an electrolyte. Our ideas on the structure of these so-called micellar electrolytes have passed through a very severe series of changes. In the early days the work of Professor McBain and others made it clear that the neutral micelle was the sphere, and from the electrical conductivity curve as well as the other molecular properties one could get an idea of how big the micelle was. The work of Hartley extended this concept by showing that the micelle would dissolve paraffin in the spherical aggregate of tails, so that we could get dispersion of oils inside the ionic micelle. That was until quite recently the generally accepted picture of soap solutions. When we come to deal with the surface phase of a soap solution we start off with a layer of soap molecules and we can build up from a strong solution quite a thick skin of soap on the surface which we believe has a laminated structure. If we take the X-ray picture of a solid soap we know that is its structure. The fact, that you can get at the surface of a liquid a skin of this soap and that the X-ray structure of a solid soap crystal has this structure, cast a doubt as to whether a micelle was truly spherical. A number of investigations have been made into the structure of soap solutions.

We find that if we try and include in a strong soap solution some hydrocarbon we can include some of the hydrocarbon between the layers, as revealed by the X-ray pattern. There is, therefore, some evidence of a laminated or swollen crystal structure for some of these soap solutions, and that is quite contrary to the view of the spherical ionic micelle. A word of caution is necessary because a number of people are swinging over to this idea and throwing the spherical soap micelle overboard. The laminated structure is only possible when the side chains can hold to one another with such force that the monolayer is relatively stable. If they are very long chains, then they can hold to one another and make a two-dimensional crystalline structure, but if they are relatively short, or if shorter chains intrude in between, then they will not form a solid laminated sheet but a fluid, and this will turn into a sphere. It would be interesting to find out at what temperature and at what chain lengths these transitions take place.

Finally, one might say that since Graham's time and since the time of Ostwald and Sir William Hardy quite a large group of substances have been included in what we term colloids, namely, the polymers or macromolecules. These are included owing to the fact that they present a big interphase although consisting of a single molecule. We have seen that colloidal gold is crystalline, but it includes in itself some auric acid in order to stabilise itself. The barium sulphate colloid particle can also be regarded as a single crystal, the ionic micelle as a crystal or as a drop; but the principles of colloid science bear equally on the types of systems of the macromolecules or polymers, and therefore the problems of how the polymer is formed and its

stability in solution or by itself or in the presence of plasticising agents must be considered.

There are a number of novel points connected with the thermodynamics of polymers, and these and some of their characteristics have now to be included in a treatment of colloids. The most difficult part and the least understood part is the relationship of the colloidal system itself to its environment. Take, for example, the case of the imbibition of water into a piece of wool or cotton. You can readily determine from X-rays that the wool or the cotton has a certain amount of crystallite in it. These crystallites are not isolated systems but are the orientated parts of long polymer chains and one long chain may take part in the formation of two or more crystallites. In such a system we can define a ratio of amorphous to crystalline. In barium sulphate we saw that by having a high dispersion coefficient you go over to the gel form. What is the ratio of this orientated crystalline material to the amorphous? There is no very precise method of obtaining this ratio, but considerable information is available based on specific heats, density, etc. If we start to put water into such a system it will fill up some of the pores in the amorphous region and the movement of the chains gets restricted on account of the entering water. The next thing that may happen is that if the crystallites start to spread from one another more links in the chain may obtain freedom, and the system begins to swell. When water is imbibed into one of these colloidal systems rather complex changes may take place, and it is not sufficient to determine the partial vapour pressure of the water alone in order to define the system completely.

LECTURE II.—*Delivered March 8th, 1948*

In the first lecture we discussed some of the problems connected with the formation of colloid systems. We saw, in general, that there were two different methods by which colloids could be prepared, namely, those methods which depend upon condensation—starting from the molecule and condensing until we obtained a colloidal particle or filament, as the case may be; then the reverse, where one took a solid and by mechanical, chemical or physical means, one dispersed this into smaller and smaller portions until one got into the colloidal region. We saw how we could define the colloidal region by the intrusion of new properties, which are determined by the interfaces. We saw that at the interface the molecules are orientated; they have quite different properties, and any system in which these interface properties play a part—and in some cases a quite predominant part—is one into which colloidal properties have been introduced.

To-day I want to talk a little about the interaction of the solvent with the colloidal particle, because here again a great number of textbooks have been written, but there are rather complicated problems connected with this and we know very little about them. They are now becoming increasingly important owing to the fact that the manufacture, shall we call it, of polymer macro-molecules has taken on such vast dimensions. We are very much interested in the properties of polymers in solution and the addition of plasticisers, and so on.

We will start at the beginning and take a simple hydrophobic system, one which has no hydration, or in which solvation is fairly small. Typical are the metals—colloidal gold, for example—the sulphides, such as arsenious sulphide and the metal oxides.

What is it that keeps the solution of colloidal gold stable? Why, when the particles are moving about, do they not hit one another and stick, coalesce and coagulate? The answer is to be found in their electric charge. We saw last time how the electric charge could develop. It might develop in one of two ways. We saw that even in a case like gold people believed that a particle of gold did not consist just of a number of molecules of gold stuck together, but that auric acid was associated with these particles of gold. This gold hydroxide could ionise, and in consequence we obtained a negatively charged gold sol. That was the extreme view of Pauli. There are others who said that that may be one of the factors, but that in addition to that adsorption of ions took place. We gave as example silver chloride. If we put into a beaker some silver chloride and add a trace of potassium chloride to it, we could get the silver chloride turned into a negative colloid by the adsorption of the chlorine ions. These are the two methods by which we could get a charge—one by the adsorption of the ions and the other by surface ionisation.

Now the position and the nature of these ions on the surface plays an important part in the stability of the particle. We noted that we had first of all the double layer in which we have both the positive and negative ions, and then we have a diffuse layer which is sometimes called the Gouy layer, and if the particles are positively charged, the negative charges are very concentrated near the particle, tailing off to what they are in the surrounding medium, while the positive charges start with the deficit and get up, of course, to the same value. So that would be the initial distribution of the ions round the particle. If we start to add an electrolyte we might anticipate that we should depress the ionisation and lower the charge on the particle, and also affect the distribution in the diffuse layer. If we increase the concentration we make this diffuse layer thinner. Of course, the electrolyte gets more and more concentrated, so the potential difference between the particle and the electrolyte gets less. Secondly, it may affect the ions in the double layer and reduce the net charge there. This is important because the net charge and the potential difference across the diffuse layer are quite different things. The latter is sometimes called the Zeta potential.

There are people who believe that the net charge on the colloidal particle and the Zeta potential are closely connected, and that in this case the Zeta potential is really dependent on the net charge. It is perfectly true that when we add a lot of electrolyte we may affect the net charge on the colloid and at the same time affect the Zeta potential. Now the stability of this colloid is due to factors affecting the Zeta potential, since, if you bring two particles close together, and they want to hit one another, they have got to overcome this potential barrier of the electric charge, and the less this electric barrier becomes the greater is the possibility of the particles hitting one another. By reduction of the Zeta potential we can bring about coagulation. Now the simplest way of looking at this reduction of charge is to consider these charges, as it were, inside a hypothetical membrane. This gives rise to what is called the Donnan distribution between the charges inside and the charges outside. Donnan showed that if sodium ions were replaced by calcium ions the ratio of concentrations of sodium ions inside to outside the hypothetical membrane would be the square root of the ratio of calcium ions, and if aluminium ions were present you would get the cube root of the ratio. Thus, we might expect that if we examined the

precipitation of colloids by different ions, first of all we should expect that negative colloids would be sensitive to positive ions, and positive colloids sensitive to negative ions.

Furthermore, if we examined the univalent, di-valent and tri-valent ions, we would find the concentration relation of n to n^2 , n^3 ; we derive this equation simply by considering the ions inside a Donnan membrane. This relationship, of course, has been well-known for many years and has been expressed in what is called the lyotropic series. Now if this were all, and the only important factor were the electric charge on the ions, it is clear that all univalent ions should act in the same way, and similarly all di-valent ions and all tri-valent ions. But we can show that differences exist between these ions. We have here a colloidal solution of arsenious sulphide and we will add first to the solution of arsenious sulphide a solution of sodium chloride and then a dilute solution of calcium chloride and then one of aluminium chloride; precipitation ensues and we see that the sodium chloride is less effective than the other two solutions, namely, the calcium chloride and the aluminium chloride. You can see the $\frac{M}{100}$ sodium chloride, which has been used, brings about scarcely any precipitation at all, while calcium chloride is fairly effective, and we see that the aluminium chloride is even more effective. These are in the right order and the degrees of coagulation are those which we should anticipate from the law I have just stated. Now we will add to the last tube some guanidine hydrochloride, which is of the same concentration as the sodium chloride; it is a monovalent ion, but you see already that precipitation ensues. The guanidine hydrochloride is much more effective than the sodium chloride. There are other ions like brucine and morphine hydrochloride which are still more effective. So one can see that it is not only the charge that is the operative factor in reducing the Zeta potential; the organic ions seem to be much more effective than the inorganic ions. The reason why hydrogen ions are very effective is because the hydrogen ion can react with the carboxyl ion to form the COOH group.

In the organic ions the rest of the molecule plays an important part, in other words, the methyl groups, or the organic portion, can adhere to the portion of the colloid particle. One of the best and most well-known examples of that is in the operation of dyeing. In the dyeing of wool, for example, which is nothing more than an interaction of the type we have been discussing between a coloured sulphonc acid and the NH_2 groups and the COO^- groups in the wool. The carboxyl group reacts with the hydrogen ion and the ammonium group with the negative dye ion. An organic sulphonc acid can react much more strongly than is the case, say, with sulphuric acid since the organic portion can also react with the protein. These dyes can dye wool from very dilute solutions, even in the presence of sodium sulphate, where one would expect a di-valent sulphate ion to be much stronger than a monovalent dye ion.

So one can see that the organic nature of the ion plays a great part in this lowering of the Zeta potential and precipitation. One can go even further: from a study of dye ions, making them more and more complex, we can find the contribution that the organic portion gives to this adsorption or this inter-action, and, it is hoped that we shall be able to say what is the affinity of a dye without ever having made the dye,

and without ever having done an experiment, simply by writing down the free energy change on adsorption of the dye, taking first of all the electric forces, and then, the so-called dispersive forces.

Now the next point that one has to consider a little with these hydrophobic colloids is, what happens when we have reduced the Zeta potential, what happens when the ions are adsorbed? The Zeta potential has been reduced and the diffuse layer contracted to a very narrow layer, so when two particles come together there is a possibility of coalescence and you get instead of two small particles one larger particle. The rate at which these particles coalesce is of interest, because it is very much like a reaction in solution. There are a number of people who consider ordinary reactions in solution as if they were gas reactions. Supposing we were considering any ordinary simple reaction like hydrogen and iodine to give hydriodic acid, then people have worked out the kinetics on the assumption that the reaction in the solution behaved as if it were a gas reaction. But we can see from a study of the rates of coagulation of these particles that that is not the case at all. The rate at which these particles coalesce is dependent upon what is called the Brownian agitation, they move about, and incidentally they hit one another from time to time, and the probability of particles hitting is given by a very simple equation. The probability of hitting is given by $W = 4\pi r^1 D$, where r , r^1 are the radii of the particles, D the diffusion constant, and the diffusion constant is given by a very simple equation

also, *i.e.*, $D = \frac{RT}{6\pi\eta rN}$, where η is the viscosity of the medium. The rate of coagulation

is similar to a chemical reaction in solution, but it differs from that in that after the first two particles have coalesced to give the binary particle, this large particle can then coalesce with another smaller one to give a tertiary particle and a tertiary will coalesce with another to give a quaternary particle, and so you can get a gradual building up.

Very few careful experiments have actually been carried out on the rates of coagulation of gold, for example, but those experiments that have been carried out do suggest that this method of looking at the process of coagulation is the correct one, as it involves the diffusive mechanism that was first of all suggested by Einstein. The energy of activation should also include the temperature coefficient of the viscosity of the solvent, so we should be able to regulate the rate of coalescence of these particles by suitable viscous media. We have seen that in colloidal glass, for example, one can get a stable colloid solution which apparently remains indefinitely in the disperse state, owing to the fact that the viscosity of the medium is so high. Now that, of course, is not taken into consideration at all in gas reactions.

I might just mention in connection with these organic ions some of the figures that I have got down here for the precipitation of arsenious sulphide. NaCl requires 51 Millimols of sodium chloride, guanidine hydrogen chloride 16.4, morphine 0.42 and neofuchsine 0.114, so one can see that the neofuchsine hydrochloride is something like five hundred times stronger than sodium chloride, although they are all monovalent.

We may go on to the next stage. We have considered the lyophobic colloids, those in which the hydration of the particles themselves is either non-existent or very small, like silver chloride, arsenious sulphide, and so on. The next and intermediary

class in which are included the hydroxides of a great number of the elements—typical of course is ferric hydroxide, aluminium hydroxide, and so on—are the reasonably solvated ions or solvated particles. We know that the aluminium, or ferric hydroxide, for example, consists of polymeric chains containing hydroxyl ions which, of course, can react with the water—and one can show that they interact with the water, because if aluminium hydroxide be placed in deuterium oxide we get exchange of the hydrogen atoms in the chain. In addition, of course, we have solvation of the aluminium ions as well. So we have got to regard these colloidal particles of ferric hydroxide, and aluminium hydroxide, as linear chains—possibly in some cases with branches—which are solvated all along their length. Now that in itself, would not provide sufficient stability, and consequently there must be some ions present. Where are the ions of aluminium hydroxide, or ferric hydroxide? In the case of ferric hydroxide, it is frequently made from ferric chloride, and if we hydrolyse ferric chloride we shall obtain ferric hydroxide, but, in addition to the ferric hydroxide, we shall have included in the sol itself a certain amount of iron chloride which may be ferric chloride, but more probably is ferric oxy-chloride, and, it is these residues that ionise to give a positive ferric hydroxide sol, including in the sol itself a certain quantity of chloride. That can be shown owing to the fact that the “gegen ion” in the solution is chlorine, and also if we take the colloidal solution of ferric hydroxide and analyse the composition of the hydroxide we find that there is a certain amount of chloride in it as well.

What happens when we start to reduce the electric charge on these solvated hydroxides? If we regard them simply as long chains, we see that we have got the positive charges all along the chain where the ferric chloride is included in the chain. Now we can add to the colloidal solution of ferric hydroxide some caustic soda, a univalent ion, and add sufficient caustic soda to the ferric hydroxide to reduce the Zeta potential of the ferric hydroxide, and we note that it sets to a gel. Now what has happened? It is clear that it has not been precipitated, but we are left with a gel which has a rigidity, and as you know we can measure a great number of physical properties of these gels. The reason for the setting of the gel is fairly clear. If we consider these fibres as interlocking they have all got positive charges on them and consequently do not stick together, but if we remove some of the positive charges just leaving a few positive charges here and there, there are portions where there is no charge. Now, the chains are moving about all the time and when a portion of one chain which has no charge on it meets a portion of another chain which has no charge on it, it can stick, and so we build up a net-work, and one can see that this net-work is rather an open one. There are two reasons why it is open. First of all, because there are charges still left on portions of the chains they repel one another and so help to hold the system open. Secondly, we have an electrolyte present—in this case caustic soda, but it may be any other electrolyte. If we have a gel which is permeated with water and has an electrolyte in it, in the membrane itself the Donnan equilibrium holds true. In other words water comes in in order to establish an osmotic pressure defined by the ratio of ions inside to those outside in accordance with the Donnan distribution. So the gel is swollen owing to the fact that we have these partly charged fibrils repelling one another and, at the same time, a Donnan distribution inside. This represents the precipitation of these colloidal hydrated classes concerning which

Weiser has collected together a great deal of information under the title "The Hydrous Oxides", where one can examine the methods of preparation at one's leisure.

One can see that there are two effects which are important here. First of all, the fact that they are solvated, and secondly, that there is only contact at the various points where we have reduced the charge. Now the strength of these gels depends, of course, on the number of contacts, and a very classic example of the effect of these contacts is to be found in the clay which is termed bentonite. Bentonite is a typical clay, it contains aluminium silicate. If we put some of it into water we will obtain some aluminium hydroxide and some aluminium silicate. If we start to add a small quantity of electrolyte to this clay suspension we find first of all on the addition of the electrolyte that the movement, the so-called Brownian movement, begins to stop because we are discharging the fibrils that are lying in between these particles. We cannot see the fibrils—some people believe they are not there, but in point of fact, if one analyses the solution we find that there is soluble material present which constitute the fibrils in between the particles. As we start to discharge the fibrils then the particles get more and more anchored, and the first thing that happens is the Brownian movement of translation ceases. If we add a little more electrolyte then the Brownian movement of rotation ceases, and at this stage we get a very interesting phenomenon—we find that the gel is rigid and quite strong, but if we shake it up very strongly it will liquify, we break the contacts which we had between the particles and fibrils. If we allow it to stand for a little time the Brownian movement will bring the fibrils into contact with one another again and the contacts will re-form. That is called thixotropy, and this is a thixotropic gel. Here is a suspension of bentonite—I do not know whether you can see that it is quite fluid—we will let it stand for just a moment or two and we see that this fluid sets to a gel which is sufficiently strong in texture for it to stand up by itself. If we shake it up very strongly it is quite fluid again. These thixotropic systems are being made use of now in industrial work in all sorts of directions, especially in connection with the paint and varnish industries. So the hydrous oxides are a little different from the oxides themselves in that when we discharge them the hydration is still left on the particles.

We can see that in order to precipitate this still further we have to add much more salt. When we add just those small concentrations of salts which are required to reduce the Zeta potential we get the gel which is still solvated, but by the addition of large quantities of salt we start to dehydrate the gel and it will become more and more desiccated until, in the case of ferric hydroxide, for example, we can actually get a precipitate of what is termed Goethite $\text{Fe}(\text{OH})\text{O}$. Goethite is an interesting substance, because the precipitate can be obtained in laminar forms, and these particles settle down separated from one another by short distances. If we shine light on the surface we obtain interference colours, and the precipitate reveals these rather beautiful colours which are formed by the laminæ of Goethite. The effectiveness of these solvated colloids has been made use of in another direction. I might mention here the gold number of Zsigmondy. On the addition of electrolytes to colloidal gold we saw that it was very sensitive. A millimolar salt solution would effect the precipitation or partial coagulation of a gold sol. If we added to the solution

beforehand a small quantity of one of these hydrous oxides, or still better of gelatine, the gelatine or the hydrous oxide would be adsorbed on to the surface of the gold particle and we attain instead of a naked gold particle a gold particle covered with a layer of gelatine. If we examine the influence of the salt on both those particles, the first is found to be very sensitive to the salt, but the other requires rather a lot of salt, and Zsigmondy proposed to test the effectiveness of these hydrous colloids by the amount of salt one had to add to a solution to effect precipitation.

We have here a gold sol to which we will add some gelatine. This is the protected one. Now we will add the same quantity of salt to it and to the unprotected one. Already the particles in the unprotected one are starting to get larger and larger. Now one can see the change from red to blue. If we add still more salt we should eventually get coagulation. Now one of the points that is of importance is that if one carries out this experiment with amphoteric substances, *e.g.*, gelatines, then we know that the gelatine can exist as a positive ion on one side of its iso-electric point and on the other as a negative ion. Colloidal gold, as we have seen here, is usually negatively charged owing to the fact that it relies for its charge on the ionisation of auric acid. Now if we bring negatively charged gold together with positively charged gelatine we ought to get interaction and precipitation, and that is exactly what does happen. We add a very small quantity of positive gelatine to gold and get precipitation, while if we add excess of gelatine to the gold the gelatine is still adsorbed and the result is that we get a positive gold sol protected with gelatine. That was not noted for quite a long time; before, experiments were done in order to show that you did get precipitation of a hydrous oxide or a hydrated colloid like gelatine with gold if they were of opposite charge. So much for these semi-solvated colloids, namely, substances like hydrous oxides.

We might now look at some of the problems connected with the still more solvated systems. We have a great number of these as far as aqueous solution is concerned. The first observation that one has to make is that if we add electrolytes in small quantities, while we can reduce the Zeta potential—and that can be shown because the viscosity of the solution changes and there is a relationship between the viscosity and the Zeta potential—they are not precipitated. It is only when we add a large quantity of suitable electrolyte to these substances that we actually get precipitation. Indeed, in the case of the globulins, a plot of the ionic strength of the electrolyte against the solubility reveals an increase in solubility before the decrease sets in. The salting out effects of the various cations and anions varies considerably from ion to ion. Thus, the flocculation of these hydrated colloids is more complex than it is either for the unhydrated ones or for the semi-hydrated fibrils which we have been discussing.

If one looks at the problem a little more closely, one finds that there are several factors operative. The first factor which was first of all investigated by Katz, and very little attention has been paid to it since, is the fact that certain substances when added to, say, a starch solution, will clear that starch—in other words, we render it more solvated—while other substances when added to starch make it less solvated and more sensitive to the precipitation by electrolytes. The types of substances which Katz investigated are quite interesting. The principle is rather a simple one. If we add a substance like thiourea to starch or to a protein in solution, we can show that

it is adsorbed, and by this process of adsorption we have not only broken possible hydrogen bonds holding the starch or protein together but we have also made our protein more soluble in water by attaching the polar NH_2 groups to it. If instead of taking thiourea, we take say, diethyl thiourea, instead of attaching polar groups we have attached non-polar or lyophobic groups, and so rendered our protein less polar or less solvated. This principle can be applied to a great number of these substances, like the starches and the proteins.

This type of adsorption crops up in unexpected ways. For example, we can measure the mobility of proteins in an electric field, the so-called electric cataphoresis, one of the methods of separation of proteins one from the other, and of identification of particular proteins. The experiments are usually carried out in buffer solution, and quite recently in examining barbiturates as buffers, in fact very effective buffers, we found that a phenomenon similar to this was taking place. The organic ions were adsorbed on proteins and altered the dispersion of the proteins very considerably. So when dealing with protein chemistry the proper choice of buffer solution may become quite an important one when we look at it from the point of view of this balance of hydrophobic to hydrophilic forces.

We have seen that when we take colloidal ferric hydroxide and start to reduce the Zeta potential, part of the chains which are neutralised in respect to electric charge can adhere to one another and make up a network which is joined at various points, and this can be stable if there are a sufficient number of points of contact. Thus we obtain a rigid system which we can only break up on agitation, or, indeed, so rigid that we cannot readily break it up. With these highly solvated systems like the proteins one can do the same thing. In other words, one can go from the sol to the gel form by the addition of a suitable quantity of electrolyte, or indeed, by the addition of a suitable quantity of material into which we put this non-polar group and a small quantity of electrolyte. But in between the sol and gel form there is a very interesting state which is called the coacervate. We will make a coacervate by taking iso-electric gelatine and adding to it ethyl alcohol. Ethyl alcohol has the same property of dehydrating the colloid as the diethylthiourea has, but is somewhat less effective. We have added the alcohol to the gelatine, and you can see that no gel is formed, but it is a liquid phase which separates. The inter-locking fibrils have such little cohesion to one another that the gel can flow quite easily. Thus we can transform a sol to a coacervate. If we dehydrate the coacervate still further we obtain the gel. The coacervates have in all probability very important implications in biological systems. There are a number of people starting from Claude Bernard who believed that anæsthesia was connected with this conversion of the sol to the gel, but it is quite probable that it is this delicate balance of solvation of the coacervate in which a great number of our biological systems exist, *e.g.*, protoplasm may be something in the nature of a coacervate. I mention this because of the very beautiful balance of forces of solvation and dehydration with which we are here concerned.

If we determined the viscosity of any dilute solution of a protein and add more and more salt to it, we lower the viscosity because we are lowering the charge on the particles. We get down to a certain value and the substance will still remain in solution because it is so solvated. If we add still more of certain salts we may effect sufficient dehydration to precipitate the material, and the viscosity curve falls

further. Many salts, *e.g.*, potassium chloride are not effective as dehydrating agents, but the proteins can actually be precipitated by suitable salts. We have seen that this dehydration can be accomplished in other ways, *e.g.*, by adding, say, alcohol. Now, if we examine various alcohols we find rather an interesting relationship between the precipitating power of an alcohol and its dielectric constant, in fact a linear plot. In order of increasing efficiency we obtain methyl alcohol, ethyl alcohol, acetone, propyl alcohol and hexyl alcohol. If we assume that the removal of water from the surface is taking place it suggests that the dielectric constant of the water of solvation has a value of something like 8. We have seen that we can also precipitate proteins by smaller quantities of substances like diethylthiourea or tannic acid. We will demonstrate the precipitation of gelatine by tannic acid. We can regard the tannic acid as interacting with the gelatine and putting a number of non-polar groups into the gelatine, rendering it less hydrophilic, so that it will actually precipitate in the presence of small quantities of salt.

Imbibition of the colloid by water or by non-aqueous media in the case of the polymers represents an approach to the question of solvation from the other end, and we might pay some attention to one or two other points in connection with such solvation. Supposing we take a polymer and place it in a medium in which it will disperse, we know first of all that dispersion can be complete in the proper solvent, but if the polymer is cross-linked in any way, the dispersal is not complete. The polymer swells to a certain extent and then it stops. The process of imbibition of liquid in many cases seems to start with great difficulty, but after you have swollen it a little, then you can go on adding more solvent and it will disperse more readily. How can we account for that type of reaction? We now notice, first of all, if we deal with all these polymers that they are in general partly crystalline and partly amorphous, and the usual view that we take of such polymers is that they consist of the fringed micelles. Different portions of the long chains may actually be adlineated with one another, so that we get portions of the chain which are irregular while other portions of the chain are lined up to one another, so that any polymer consists of a certain quantity of amorphous material and crystalline. Now the ratio of crystalline to amorphous depends upon the nature of the polymer. If the units in the chain have irregular side groups, then the polymer is practically all amorphous. If, on the other hand, it has straight chains whose Van der Waals fields can attract one another, or in the case of, say, cellulose, have hydrogen bonding across the chain, then it may be nearly all crystalline. In the case of rubber, for example, the chains are all very flexible and part of it is adlineated and part is amorphous. If you stretch a piece of rubber you adlineate the fringed micelles first a little and then more and more of the chains become crystalline, so the ratio of the crystalline to amorphous varies from polymer to polymer and also varies in one polymer depending on the extent of extension.

Now if we examine the polymer we can see that in these little crystallites the chains are stuck to one another and cannot move, but the amorphous portions are free and are flexible. If we try to put some solvent into this polymer particle, in the first place the solvent will go into the amorphous region. It clearly prevents the amorphous portion from moving about as much as it did before, because we have now got solvent molecules in between the chains, so there results a change in the

entropy of the system and this entropy is a decrease of entropy because the chain movement is restricted. The solvent accordingly does not want to go in and it will only go in if there is an inter-action energy. If it is, for example, the inter-action of a liquid like water with a polar group then there is a heat of wetting, an exothermic reaction. So we can see that all solvents will not go into all polymers. If we consider that the solvent has entered the amorphous region and we add more solvent so that it solvates along the chain, just as it does in the case of ferric hydroxide, the chains will be extended, and the polymer will slowly start to swell and separate and disperse the crystallites. So the first thing that happens is that there is this entropy decrease going on which one should be able to determine by specific heat measurement, if done accurately enough. After that, the solvation can increase with the ultimate dispersion of the crystallites, and you are left with a gel, which may then go into the sol form. A gel which has cross-links in it can only extend to a certain extent; it attains an equilibrium value. If we write down the condition $\Delta H = \Delta F - T \Delta S$ the equilibrium is attained when $\Delta F = 0$. So we have the heat of reaction equal to $-T \Delta S$. This is a very important relationship, because it allows you to determine this entropy change from the heat of reaction.

The heat of mixing of two liquids can be evaluated in different ways. One of the methods of evaluating heat of mixing is, of course, to do the experiment directly and find out how much heat is evolved on mixing. That requires very accurate calorimetry; it can be done, and indeed you can now build calorimeters that will even measure the heat of the mixing of benzene in cyclohexane, which is quite a small heat evolution.

One can also calculate these heat changes of mixing from what is called the cohesive energy. If we know the latent heat of evaporation of one liquid and the latent heat of evaporation of another, which are measures of the cohesive energies of the liquids, we can see that imbibition depends upon the difference of cohesive energies of the liquid and the polymer. While it is not an easy matter to determine directly the cohesive energy of a polymer, you can get a rough idea of it by considering the dimers or trimers, if they happen to be liquids, and measuring their cohesive energies; but one can calculate it by taking a series of liquids of which the cohesive energies are known and finding out how much your polymer swells in each of them.

For example, the cohesive energies and the swelling of rubber in aliphatic and aromatic liquids have been determined by Dr. Gee. The full curves obtained give the calculated degrees of swelling for liquids of different cohesive energies as determined from the latent heats of evaporation first for aliphatic series of solvents, and second for the aromatic series of solvents. The agreement is by no means perfect, but there is a very close correlation between the degree of swelling of these vulcanised rubbers and the cohesive energies of liquids as determined from their latent heats of evaporation.

If one looks at the problem a little more closely one can see where the errors may arise. You must imagine that in the evaporation of a molecule such as, say, acetic acid, you are pulling a fatty acid molecule such as acetic out of liquid acetic acid. You first of all pull out the CH_3 group—that is easier to remove than the carboxyl

group, which is more difficult—so the latent heat does not really give you a full account of the interaction of the molecules.

To give a more complete account of the molecular interaction we have got to consider the CH_3 groups cohering with CH_3 groups, the CH_3 groups with carboxyl groups, and the carboxyl groups with carboxyl groups. Thus, if we could find the interaction energy between those three pairs of groups, then we would have a more complete account of the internal cohesion or cohesive energy.

I have tried to cover in this lecture a few of the points in connection with solvation. I would just like to show one last experiment which is a very interesting one. Here is the ordinary chemical garden, which most of you may recognise, made by dropping in crystals of various salts into waterglass. We will drop a crystal of cuprous chloride into a solution of potassium ferrocyanide and, as you know, when the copper chloride dissolves, the cupric ion reacts with the potassium ferrocyanide to form the insoluble copper ferrocyanide. That forms, as it were, a skin over the surface because the copper ions are very concentrated where the crystal is dissolving. The skin is permeable to water and since the copper chloride goes on dissolving the solution inside gets more concentrated. As a result, more water diffuses in and the flexible membrane continues to grow. You can see it growing as the copper chloride dissolves and reacts with the potassium ferrocyanide. If you were a botanist or a biologist you might be rather fascinated by this growth. But this is a purely inorganic growth. You can see the brown copper ferrocyanide forming and the blue hydrated cupric ions have not yet quite disappeared. This is another example of the effects of the Donnan distribution.

LECTURE III.—*Delivered March 15th, 1948*

In the last lecture we were dealing with one of the problems connected with the colloidal state, namely, the relationship and the interaction of the colloidal particle with the circumambient medium—solvation or hydration as is most usually the case. I thought to-day we might consider quite broadly and briefly another rather general topic; how can we get information on the size and shape of the colloidal particle. That is important because it links us with ordinary molecular physical chemistry. As far as colloidal particles are concerned, they may consist, as they do in the case of a number of polymers, of single, but very large molecules (the macromolecules), or they may consist of an aggregate of the atoms or ions forming a small crystal, or they may indeed be an amorphous aggregate of a series of micro-crystals or even unordered molecules; so we are quite safe when we talk about the particle mass, but we are not always safe in calling it the molecular mass, although in many cases the particle mass and molecular mass are the same thing.

Then there is another point of quite general consideration. When we came to deal with colloidal particles we saw by their methods of preparation that, in general, they were not all the same size. If we started with the ultra microns we saw that they could be fused together, especially at the isoelectric point to make microns and micellar particles. So there is in general a distribution of size among these macromolecules in the case of polymers or among the particulate suspensions. We have to distinguish the different types of mass measurements that we make, whether we are

getting a mean mass measurement of the number of particles, or a mass number distribution. We note how the colloidal solutions differ from those concerned in ordinary physical chemistry, where, as we know, the molecules are all identical with one another.

When we want to get some information on size and shape it is very clear that we have got to have certain conditions fulfilled. It is not always laid down quite clearly what these conditions are. First of all, in any sort of measurement that we are making we have got to be quite sure that the particle is free from interference by its neighbours. The results of any measurement we make must be interpreted in terms of the single undisturbed particle. Then again there are many dynamic methods that have been used. Now, in hydrodynamic flow, we know that the shape of the particle has a very important bearing upon the rate of the flow and the evenness of the flow of the particle in the medium. These dynamic methods clearly have to be used with caution: any shape factor that we obtain from a hydrodynamic consideration has to be susceptible to analysis. Hydrodynamics is a complicated subject, and it is only for rather simple systems like the sphere, the ellipsoid, the disc and the rod for which we have, at any rate at present, an idea of the type of movement that these particles can make. Then there is another consideration which is of importance, as a number of these polymer particles are long and rod-shaped. The question arises whether these are rigid rods or whether they are flexible; whether they are bendable in the sense that they are normally rigid but can be distorted and bent by the application of a sufficient shear. The question also arises, if, in the case of these flexible rods, the shear exerted by the flow of the liquid at certain velocities may cause some alteration in the shape of the particle; whether, for even more flexible particles, the thermal agitation may allow the rods to take up contracted and bent configurations.

Those are the questions that induce much greater complications than they do in ordinary physical chemistry, but it is very clear that, to those people who are interested in the study of polymers—a branch of colloids—those are very important questions that have got to be answered. One might look first at some of the methods in which we are not dependent on the rate of shear because we have seen that the dynamics of the particles induce uncertainties. Probably in point of experimental precision the principle of applying two forces to the particle or the system of particles until it becomes an equilibrium system is the most exact. If we can evaluate these forces accurately and determine the conditions of equilibrium then the mass of the particle can be obtained with some degree of assurance.

One of the most reliable of these methods is the one where we balance the osmotic pressure, which we shall have to discuss in more detail later, against the centrifugal field. If, for example, we take a cylinder and we put particles in at one end, they will start to diffuse along the cylinder, and we know that the rate of diffusion depends upon the osmotic gradient. Now, if, at the same time, we can apply in the opposite direction, a centrifugal field, so that the system just balances, then we obtain a very simple relationship between the molecular weight or the mass weight, and the concentrations across any zone which we can measure:

$$M = \frac{2RT \log \frac{c_1}{c_2}}{(1 - Ve)\omega^2(x_1^2 - x_2^2)}$$

where c_1 and c_2 are the concentrations at distances x_1 and x_2 from the rotor axis; V is the specific volume of the solute; e the density of the solution, and ω the angular velocity. This is, as most of you probably recognise, just an extension of Perrin's work on the settling of particles under gravity, but we replace the gravity here by the centrifugal field. So one of the great weapons of attack on the masses of these particles, whether they are crystalline or polymeric, is by using the ultracentrifuge, and the most precise method of utilising the ultracentrifuge is to establish conditions of osmotic equilibrium. Unfortunately, the establishing of mass osmotic equilibrium frequently takes a period of many hours, if not days, so the number of occasions where this method has been used is still small, but it is a method the use of which should be encouraged. The use of the ultracentrifuge for finding the mass simply from the sedimentation velocity is, of course, becoming much more usual. These ultracentrifuges, as you know, were first introduced by Svedberg, and in this country there are two of the oil-driven type. They are very elaborate, far beyond the means of the ordinary university or industrial plant. Some time ago I was rather interested to see how far one could make an apparatus that was suitable for laboratory work, and we developed and got made in America an air-driven centrifuge of the Beams type.

The principle of this centrifuge is as follows. There is a turbine driven by compressed air, rotating about a vertical axis. At the same time there is another air jet underneath which lifts the turbine up. So when the turbine is rotating it is floating in the air like Mohammed's tomb. In that way it can be driven at a very high speed. Attached to the turbine is a piano wire, running through two bearings in which the system is kept stable. At the bottom of the piano wire there is a little bolt which screws into the rotor arm, which has also in it a cell into which one can put the specimen that you are going to examine, say, a solution of a polymer in a suitable solvent or a solution of a protein in a suitable buffer mixture. In order to increase the velocity and minimise the heating effect, the vessel containing the rotor is evacuated and one admits something of the order of five to ten millimetres of hydrogen, and that keeps the rotor much cooler than if it were running in a vacuum. In order to measure the speed of the rotor there is a small piece of iron which rotates and every time it passes through the field of the electromagnet it induces a small current in it. One can thus measure the speed of the rotor with great accuracy. It is frequently customary to measure the speeds of these rotating bodies by means of a stroboscope, but the speeds here are so high that you never know whether you are on an overtone or not and that makes a very serious difference to the speed that you are actually dealing with. These electrical methods have proved very effective.

Now in order to measure the velocity of sedimentation in the centrifugal field a beam of light passes through a collimating lens system, then up through the little cell and then to a mirror, and then from the mirror it passes to the Schlieren system and camera on a long optical bench. When one starts, the composition in the vessel is quite uniform, but as the speed gets up and you keep it spinning (and I could mention that the field in a system like this can attain a value of about a third of a million times gravity, the limit of the tensile strength of the material),

the particles will be spun out towards the periphery. Now the refractive index of the solution depends upon the composition; so in a short time we get a refractive index gradient from the inside to the outside. One can, from the light going through, pick out a section in which the refractive index gradient is uniform and measure the rate of change of the index from the inside to the outside.

The light passes out from the turbine through an aperture in a brick wall which has to be erected because rotors sometimes fly to pieces—and it is very unpleasant to be perforated by a piece of turbine. The light passes into a slit and then into the optical system which consists of what is called the Philpott “Schlieiren” apparatus. This is a knife edge set at a particular angle so that light in which the refractive index exceeds a certain value does not pass over the knife edge but is caught by it and only light of a certain refractive index passes over it.

Now if we examine the type of diagrams obtained. The peak represents the zone of definite refractive index. Then, after a certain length of time, you take a photograph again, and after a similar length of time another, and so on. We note that the zone of definite refractive index travels from the left-hand corner to the right-hand corner of the photograph. We can measure the rate of travel quite accurately and thence obtain the sedimentation constant. It is interesting to note how sharp these peaks are, which indicates that the system is either a mono disperse system, or in other words, that the material is apparently quite uniform, or it is travelling *en masse*; and that is one of the complications that one is never quite sure about—whether the units are travelling *en masse* or as individuals. In order to ensure that they are travelling as individuals, you have got to work to extreme dilutions and show that the velocity is unchanged. We shall see later some effects due to asymmetry, in which there are important factors to be considered. This represents one of the general methods of determining some information on mass.

Now, the second general set of methods, that depend upon equilibrium and not upon dynamics, are those using the osmotic pressure, and there the general principles are quite well-known. The factors that we have got to consider in osmotic pressure are rather important from the point of view of getting some information about the sizes and shapes of these particles.

The ordinary osmotic law is usually written $\pi V = RT$. That was a law introduced by van't Hoff and we might recollect how he introduced it and why. You remember there were certain botanists, of whom Devries was one of the most famous, who examined the cells of a plant called *Tradescantia* and noted that when they put these cells into water they swelled up enormously, and when they put them into salt solution they contracted. The swelling pressure called originally the turgor pressure was later identified with the osmotic pressure. Now the botanists showed that the osmotic pressure π was in proportion to the concentration of the solute (with electrolytes, of course, we know that there are other complications). They also showed the osmotic pressure was proportional to the absolute temperature. If it is proportional to concentration and the absolute temperature, it must be proportional to the product of the concentration and the temperature; since the concentration is the reciprocal of the volume or dilution, then πV must be proportional to the temperature and it was found that the proportionality factor was identical with the gas constant. Van't Hoff thus concluded that solutes behaved

as if they were in a gaseous state and the osmotic pressure exercised by a gram molecule in 22.4 litres was 760 millimetres. One knows, of course, that that is not so, and unfortunately many ideas concerning osmotic pressure have been based upon that rather bad fallacy.

When we plot the osmotic pressure—and it is convenient to plot the $\frac{\pi}{c}$ curve against the concentration—we ought (if this law be true) to get a straight line which is independent of the concentration, because $\frac{\pi}{c}$ at any one temperature should be equal to RT . When we do the experiment we find that in general the $\frac{\pi}{c}$ curve for these polymeric solutions is curved, and consequently we have got to determine osmotic pressures down to high dilutions.

The first point of importance is in connection with the general theory, because we know that the osmotic pressure of a solution is related to the free energy ΔF , and that $\pi V = \Delta F$, the osmotic work. Now the free energy is related to the thermal energy and the entropy, $\Delta F = \Delta H - T \Delta S$. So the first thing that may cause a curvature in the system is that there may be a heat of solution. Now we know very little about the heat of solution of polymers in their dispersion media. Nobody has determined, I think, the heat of solution of colloidal gold in water. If these heat terms are very small and we call them zero, then of course that simplifies the argument, but we must realise that we may have an error due to a heat of solution and indeed we know that in certain systems the heats of solution cannot be neglected.

The next thing is in connection with the entropy. If we regard the polymer particle as a little round ball and the solvent molecule also as a little round ball so that when we take a solvent molecule out and put a particle in, we do not interfere with the solution, then they are quite interchangeable. We can, anywhere, exchange a solvent for a solute particle and as this is the same size and has the same sort of properties as the solvent, we are not disturbing the solution. Then the entropy change is jointly $\Delta S = -R \log N$. This factor at once gives the relationship between the osmotic pressure and the mol fraction which is the form in which the van't Hoff law should really have been expressed. Unfortunately, our polymer particles are not little round spheres and not the same size as the solvent molecules. They are much bigger, and they may be flexible. Supposing we take a chain of balls and lay it across a lattice of little holes in each of which we imagine a solvent particle. The chain might be bent, or straight, and might occupy or stretch across four, five, six or more holes. In other words, we cannot employ this very simple equation for the entropy of the solution when we put in a polymer, because a polymer molecule may disturb, in this particular case, no less than six of the solvent molecules. Then another polymer particle might be rolled up in a ball and might just occupy one or two places. Thus, if we have polymer particles which can interact with the solvent, then we have got to put a correction term in the equation. The usual method now is to write $\frac{\pi}{c}$ (which is the osmotic coefficient) equal to $\frac{RT}{M}$, and you add a term $+(\frac{1}{2}-\gamma)C$ where γ is called the interaction term between the solvent and the polymer. In general we obtain a curvature because there is always this second term,

and the simplest way of expressing the second term is by a γ coefficient, which takes care of any heat change, and also takes care of the entropy change when you have got a large solute particle.

Other people have looked at this from a slightly different point of view, and tried to interpret the curvature in terms of the number of links that there are in the polymer chain, and the number of solvent molecules one portion of the polymer chain will replace. That is travelling on much more uncertain ground, because we really do not know in all cases whether these polymer chains are really linked or not. It is much safer to adopt the methods of Huggins, and put it all into the interaction term γ and then try to analyse these interaction terms in a more definite manner. These are the bases of the osmotic method which is the important static method.

When we come to deal with dynamic flow then the first and most important method is based upon diffusion. Diffusion methods in general depend upon the fact that a particle moving in a viscous medium suffers a certain resistance to flow. So, after a certain time, the particle under a constant force will acquire a constant speed, and we can measure that speed, and thence obtain the diffusion coefficient. If the movement is caused by osmotic pressure, and if we say we measure the rate of diffusion from a concentrated solution to a dilute solution, the Fick law can be assumed to be correct. In other words, provided the diffusion constant does not vary with the concentration (and there are cases in which the diffusion constant does vary with the concentration, because as I have mentioned it is only in extreme dilutions that particles do not interfere with one another), then, under these conditions of dilution, the diffusion constant is given by $\frac{RT}{f}$ where f is what is called the shape factor.

Now there is a good deal of dispute about the shape factor. For a sphere it is fairly simple. The shape factor for a sphere is given by the Stokes equation as $6\pi\eta r$ so that the diffusion constant $D = \frac{RT}{N6\pi\eta r}$

If we go over to other forms then we have different shape factors. For example, if instead of a sphere we have an ellipsoid (many of the proteins appear to behave like ellipsoids), then the shape factor f' for ellipsoids is the shape factor for a sphere which has the same volume and density as the ellipsoid times the axial ratio, *i.e.*, $f' = f \frac{a}{b}$. That is for an ordinary ellipsoid of rotation. If we have a generalised ellipsoid

then, instead of $\frac{1}{f}$, we have to write $\frac{1}{3} \left(\frac{1}{f_1} + \frac{1}{f_2} + \frac{1}{f_3} \right)$, so we see that from the diffusion rate we get certain information about these particles, but one is left with a shape factor f and you cannot tell whether it is a sphere or an ellipsoid or a generalised ellipsoid. If however we take the value for molecular weight from the diffusion constant, and the molecular weight from the osmotic pressure, or from the equilibrium in the centrifuge, then one can get some idea of the shape factor, because we have got two methods of deriving the mass and one of these contains the shape factor, namely, the dynamic process.

One other point in connection with diffusion is of importance, and very

little work has been done on this. Supposing the diffusion is taking place in aqueous solution and supposing the particle is charged, then if we regard the particle as a large ion and as a sphere, Nernst showed many years ago that the diffusion constant for an electrolyte was dependent upon its charge. He obtained

the equation $D = \frac{RT}{6\pi\eta N} \cdot \frac{n^+ + n^-}{n^+ r^+ + n^- r^-}$ where $n^+ =$ charge on positive ion of

radius r^+ , and $n^- =$ charge on negative ion of radius r^- . The method of Nernst can be applied to colloidal particles. I have looked in the literature to see how many applications have been made and I can find very few of them—I can cite one in connection with the starch particle. It is interesting to give you the values that I have found because it shows that it is, in point of fact, a rather powerful method of examining some properties of these colloidal solutions. If we take a spherical starch particle for which the molecular weight is a hundred thousand and the radius is 40\AA , the diffusion constant at the isoelectric point when uncharged was 0.53×10^{-6} . Now when it was charged with five negative charges, and an equal number of univalent positive ions of radius 1.8\AA were introduced, then

$D = 2.12 \times 10^{-13} \frac{1 + 5}{1 \times 4 \times 10^{-7} + 1.8 \times 10^{-8} \times 5}$. The diffusion constant thus

becomes $2.5 \times 10^{-6} \text{ cm}^2/\text{day}$ instead of $0.53 \times 10^{-6} \text{ cm}^2/\text{day}$. So one can see how much more rapidly the charged particle moves. The univalent positive ions are moving much more quickly than the big starch particle, and want to get on ahead, but they pull by electric attraction the big starch particle behind them. By doing this at different pH 's it is clear that one can measure different D 's; or conversely, we can get information in respect to size or charge.

Just to give some examples of the values of these diffusion coefficients, I can cite that with HCl of molecular weight 36.5 the diffusion constant in centimetres squared per second $\times 10^{26}$ is 25 . Maltose, molecular weight 342 , has diffusion constant 0.42 ; lactalbumen, molecular weight $17,400$, has diffusion constant 0.106 ; urease, which is an enzyme, molecular weight $480,000$ has diffusion constant 0.035 ; and haemocyanine which has a molecular weight of over six million, and which is a protein from a snail, has a diffusion constant of 0.0138 . It does not appear in these latter cases whether the diffusion constant has been measured at the isoelectric point or not; but one can see that it is possible, by means of diffusion, to obtain not only some idea of the mass, but also some idea of the electric charge as well.

We can see that we can apply accelerated diffusion by replacing osmotic pressure by the centrifugal field, but we can also use electrical methods, and the method of electric cataphoresis is now extensively employed.

On submitting a colloidal solution to electric cataphoresis, the particles will start to move at a velocity dependent on the applied potential on their charge, and also on the viscosity of the medium. If they are different particles of quite different electric mobilities we can separate them by continued cataphoresis.

If we examine a picture of the movement in the electric field of a highly symmetrical substance, Schlieren photographs taken across the field at different time intervals, we can see that the curve remains substantially symmetrical. In other words, the advancing front and the retarding front have got the same slope. We see

that it broadens a little, which means that the Brownian movement is gradually dispersing the particles as they move forward in the electric field.

Now if we take an asymmetric system, the distribution curve is then no longer symmetrical but has a skew on it. That means there are in this colloidal solution a number of particles which have either all the same charge and slightly different shapes, or all the same shapes and slightly different charges, or a mixture of the two. In other words, slightly different shapes and charges. But they are not all identical particles, so, by a refinement of this cataphoresis method, it is possible to get some information about the size and shape, and the distribution of sizes and shapes, of these particles. One can see that electrical cataphoresis is a very valuable method of attack.

The usual technical method of assaying properties of some of the emulsions, and also of polymers in solution, is by determining the viscosity. A great deal has been written about the viscosity of colloidal solutions. One knows that immediately one departs from the simple law which Einstein put forward: The viscosity of the solution $\eta = \eta_0(1 + 2.5\phi)$ where η_0 is the viscosity of the solvent and ϕ is the volume of the disperse phase, we get into a lot of trouble. There have been a great number of proposals made for interpreting the viscosity. We might try and find out a little what are the reasons for this departure. The first and obvious one is that if we put a particle of starch into water it will, as we saw in our last lecture, imbibe a certain amount of water and so the question is whether the Einstein volume is the volume of the original dry starch or the swollen starch. We saw also last time how the degree of swelling of the starch particle would depend not only on the solvent but on what you added to the solvent, that it varied with the charge on the particle, the osmotic pressure and the electrostatic repulsion, and also varied, as we saw from the work of Katz, with the addition of different organic substances like thiourea and indeed many of our buffer solutions which our biological friends use without worrying very much about them. Just to give you some idea of the degree of solvation, we can obtain a value from the ratio of the hydrodynamic specific volume to the dry specific volume. These are the sort of figures we obtain: Sucrose 1.6; Sulphur in water (which is a very surprising and interesting case) 12; Gamboge in water 1.25; Rubber Latex 1.0; Clay 9.0; Starch 20; Isoelectric gelatine at 40° C. 6; Isoelectric gelatine at 20° C. 30; Cellulose Nitrate in Ethyl Acetate 80; Rubber in Benzene 300-400. So one can see that in some of these substances this apparent increase of solvation becomes enormous. I mentioned that in connection with diffusion it was often difficult to decide whether the particles move independently of one another, and one might well inquire whether here, in the case of gelatine at 20° for example, and even with starch, and especially cellulose nitrate in ethyl acetate and rubber in benzene, the particles are moving freely when we are measuring the viscosities or whether they are not, shall we say, in a network.

The next method of looking at this question of viscosity is to consider the particles in the solution as interacting with the solvent. If we call the particle P and the solvent S, we can see that if we put particles into the solution we will have solvent-solvent SS, then particle-solvent PS, and particle-particle PP contacts. Now, supposing the particle-particle PP adhesion is very high, then the particles will either want to stick together or to roll up in a ball so that they can stick to themselves. If the particle-

solvent PS adhesion is very high then the particles will want to stretch out so that the solvent can stick on all along their length. Thus the shape of the particle may depend not only on the particle nature itself, but also on the solvent we put it in. Professor Mark, in Brooklyn, has over the last five or six years devoted a great deal of attention to the shape of the particles in different types of solvent. The viscosity, in other words, like osmotic pressure should be a linear function of the concentration C , if the Einstein law held true. In its simple form we ought to get a straight line for η/c against c . In general, we get a curve, and as in the case of osmotic pressure we can express the curvature by introducing a correction term, here termed β . This β term depends, just as we saw the osmotic pressure term depends, upon the entropies of the contacts, as it were, between the solvent and the solute. We saw how many solvent molecules one solute particle could displace, and the different configurations it could take up; so this curvature depends very much on the number of contacts of different sorts, and only if this is an unimportant factor does the curve approach linearity. Some people assume that there exists a mass action law between these contacts, and that by working out the equations we can get some idea of a theoretical curvature. This has been carried out for a number of substances and permits us to get some idea of the shapes of the particles in the solution and whether they are spherical or linear and whether they are flexible.

The most recent method of trying to get some idea of the shape of these particles is by light scattering, and this can be demonstrated by two simple experiments. The first is just an exemplification of the ordinary Tyndall scattering. As you know, light scattering was first observed in detail by Tyndall and then Lord Rayleigh worked out the general principles. It has been developed to a precision method especially by Debye and his co-workers. There is a rather beautiful example of scattering by a dye stuff which has just been synthesised called Alcyon blue, a derivative of Monastral blue, which is a pigment. An arc lamp sends a beam of light through water. We can see the water is not quite clear, since it exhibits the ordinary Tyndall scattering by the fine particles. Now if we add some Alcyon blue we can see the brilliant red scattering, here followed by the blue, and the transmission of the green. That, I think, is one of the most beautiful examples of light scattering. The transmission being green and the scattering being red and violet indicate that the refractive indices of the material for different wavelengths vary. Actually, for the blue it is about 1.7, for the green something like 1.3, and for the red it is about 1.82, so if one is going to make this an instrument of precision one has got to be a little careful about monochromatic light and the refractive indices of the materials.

We can show the general principles of how to measure the scattered light by means of a photoelectric cell. We set up our arc lamp as before, and we pass the light beam through a suspension of arsenious sulphide, that scatters the light. We place a photocell at the side and connect it up to an amplifying milliammeter; we note quite a big photocurrent when one allows the scattered light to fall on the photocell and it is possible to plot a curve showing the scattered light intensity. So we can get some idea of the mass weight of these particles from scattered light. The most recent development of this method depends upon the fact that if you have not spherical particles, but, say, rod-shaped particles, the scattered light coming from different portions of the particle may not be in phase. Instead of measuring just the scattered

light at right angles, it is obviously possible to measure the scattered light in the forward and in the rearward direction of, say, an angle subtending a right angle with the incident light. We can thus obtain a curve in which you will note an asymmetry. In other words, the scattered light forward is more intense than it should be for perfectly symmetrical particles.

These are the general methods which have come into vogue, and one can see that this light scattering method may prove to be quite a useful method when it is fully developed. The main trouble is due to the fact that any particles scatter light, and consequently we must not have any other particles present. The filtration of the solvent and the colloidal solution have got to be thorough and the filters are difficult to make.

There are, finally, two other methods which are worth noting. I mentioned that the rod-like particles might be flexible. In some cases with long thin particles one has got to consider whether, if you put them in a moving field, the Brownian agitation maintains them disorientated or whether they undergo orientation in the field. That clearly depends upon the extent of the Brownian agitation, which depends on the temperature and also on the strength of the field. Streaming birefringence reveals such changes in orientation. If we measure the angle of isocline as a function of the rate of shear for rod-like molecules, *e.g.*, nitro-cellulose, we can get some idea of the size of the particles from the deviations from randomness when they are put into motion, in, say, a couette viscometer.

The last method, which has been applied to the proteins with some success, is the dielectric dispersion. We find there is a resonance when the frequency coincides with the time of relaxation, and the molecular relaxation time is a function of the molecular weight and also of the shape. For example, in the case of horse hæmoglobin, the observed relaxation time was about 8.4×10^{-8} sec. and one can calculate the relaxation time from the known dimensions to be 7.6×10^{-8} . The dimensions taken are a molecular weight of 66,700 and the specific volume 0.75, thus, if one did not know the molecular weight one could have calculated from the relaxation time a value very close to that.

Well, Ladies and Gentlemen, I have tried, in this third lecture, to survey rather briefly, I am afraid, some of the different methods by which one can get some idea of the size and shape of colloid particles. I must admit that the three lectures I have had the pleasure of giving have only covered very limited fields, but I hope you have enjoyed listening to them as much as I have enjoyed giving them.

OBITUARY

Captain Sir BEACHCROFT TOWSE, V.C., K.C.V.O., C.B.E.—We regret to announce the death of Sir Beachcroft Towse who had been a Life Fellow of the Society since early 1938.

Born in 1864, he entered the army after being educated at Wellington. In the advance on Kimberley in the South African War, he endeavoured at the battle of Magersfontein to carry his mortally wounded Colonel to safety, and this proving impossible he stayed with him until help arrived. For this and for his gallantry in an action with twelve men against a force of 150 Boers, during which he lost his sight in the moment of success, he was awarded the Victoria Cross.

Queen Victoria appointed him Sergeant-at-Arms in Ordinary in 1900, an office he held until his death. In 1901 he joined the Council of the National Institute of the Blind and

his work in this connection became his life's task. He was Chairman of the Institute from 1921 to 1944 when ill-health forced him to resign.

REORGANISATION OF THE ROYAL COLLEGE OF ART

Because of the very close interest which the Society has always taken in Industrial Design, it is felt that some reference (although necessarily brief) must be made at this juncture to the important changes which have just been announced at the Royal College of Art. These were described in some detail by Sir Stafford Cripps and the new Principal, Mr. Robin Darwin, at the Convocation Day ceremony at the College on Thursday, July 15th, and include, in addition to sweeping changes in teaching methods, an alteration in the actual constitution of the College, which is to become a National College with its own Council and its own budgetary provision, thus allowing it freedom to develop boldly.

In the Design School, the aim is to teach the student to become a technically skilled craftsman as well as an artist, and to this end the course will endeavour to give him a firm grasp of one branch of design without allowing specialisation to narrow his outlook. The Design School is being expanded into six separate schools, of engineering and furniture, of pottery and glass, of textiles, of silver-smithing, metal-engraving and jewellery, of publicity, and of fashion, each under a Professor who will be an active practitioner of his respective art; and when the students have mastered the elements of their own chosen branch of design they will be encouraged to work on combined programmes with students of other branches. The professors have already been appointed and will include such distinguished contemporary designers as Mr. R. D. Russell, R.D.I., Mr. Allan Walton, R.D.I. and Mr. R. Y. Goodden, A.R.I.B.A., R.D.I. It is further intended to develop contact between the college and industry and the Council of Industrial Design, and, in order that the College Diploma will acquire the maximum prestige with manufacturers, licentiate diplomas only will in future be awarded at the end of the college course and associateships will be given after practical experience in industry has been gained.

At the same time it is intended that the fine arts shall remain an essential function of the college, and teaching of painting, engraving, architecture and sculpture will continue. Not only will the Fine Arts be taught for their own sake but also because of the essential contribution which they make to the development of design.

GENERAL NOTE

SPORT IN ART.—On the occasion of the Olympic Games an exhibition of sport in the various Arts is invariably presented; and the present exhibition—part of the XIVth Olympiad—which occupies seven galleries in the Victoria and Albert Museum, remains on view until August 14th. Selected artists of twenty-five nations have entered works of art and craft in competition, and few visitors will be disposed to quarrel with the majority of the awards. A. R. Thomson, R.A., for example, justly claims a first prize for a big impressionist canvas of an amateur boxing fight, in which the spot-lit figures on the ropes are rendered with brilliant technical skill. The impression of speed is conveyed with no less assurance in "The Cyclist" by the Italian painter Giovanni Stradone, another prize-winner; and so one could continue the list of unexceptionable awards, only questioning, perhaps the claims of a not very remarkable study of "Meath Hunt Point-to-Point Races" which scores a success for Eire.

Some of the most remarkable works, however, have been entered *hors concours* and were therefore not eligible for awards. Among these loan exhibits are no less than twenty-four paintings by Sir Alfred Munnings, P.R.A., ranging in scale from such noble compositions as "Their Majesties Return from Ascot" (lent by the Tate) and "The Huntsman Short with Whips" to the brilliant studies of horses and jockeys, which have been hung on two screens. The several preliminary notes for the stirring "Newmarket Start"—particularly a swift transcript of a horse, with a jockey in a blue vest up (No. 134)—testify to an unerring hand and eye, which have been tireless these fifty years. There has been no such recorder of the fading pageant of English sport in our time, and one discerns no successor in his vein.

Elsewhere, one would single out two pleasing impressions of the Ascot Paddock, with interesting patterns painted in a light key, by Dame Laura Knight, an entertaining Regency pastiche by Doris Zinkeisen, Egerton Cooper's big panoramic "Derby Day" (which wisely does not attempt to emulate Frith) and Charles Cundall's sparkling "Henley Regatta".

The paintings and drawings from abroad are, surprisingly, rather undistinguished, though a gay palette and rhythmic pattern characterises many of them, which accounts for the lively impression of the show as a whole.

A number of interesting sculptures include a sensitively modelled bronze "Fisherman" by the Italian Filippo Sgarlata, an exquisite statuette by his countryman Emilio Greco, and a powerful granite "Head of a Boxer" by Knud Nellemose of Denmark.

The assembling and arranging of close on four hundred works of art—including fragile architectural models—from so many competing countries was clearly a very considerable undertaking, and the greatest credit is due to the Olympiad's Director of Arts, Major A. A. Longden, and his collaborators.

N. A. D. W.

NOTES ON BOOKS

THE ENGLISH TRADITION IN DESIGN. By John Gloag. King Penguin, 1947. 2s.

GOOD DESIGN, GOOD BUSINESS. By John Gloag. H.M. Stationery Office. 1947. 1s. 6d.

In *The English Tradition in Design*, John Gloag traces the thread of English design from the medieval crafts through the Elizabethan period of disruption and decadence to Inigo Jones and the golden age of design which lasted until the beginning of the nineteenth century, when again, the thread was lost in the impact of the Industrial revolution. He shows how Ruskin and William Morris, both lighthouses in the Victorian darkness, unfortunately by their attempts to revive the crafts of the past tangled the knot even more by causing the fashionable desire for "ye olde England". Finally, he shows the resurgence of design with the birth of the Design and Industries Association in 1915 and the retrieving of the thread, which had been lost since Thomas Sheraton and the Adam brothers. This new King Penguin finishes with thirty-six pages of delightful illustrations of design from the sixteenth century onwards.

In his other booklet, *Good Design, Good Business*, which has been prepared under the auspices of the Scottish Committee of the Council of Industrial Design, John Gloag has confined himself in the most part to forty-five pages of excellent illustrations of good modern industrial design. In an Introduction he classifies the main applications of good industrial and commercial design, and at the end of his book he gives eight examples of how different firms have applied the principles of design to their manufactures.

RUSSIAN ICONS. By David Talbot Rice. King Penguin Books, 1947. 2s.

OUR FATHER. Evans Bros. 1948. 21s.

IN PRAISE OF FLOWERS. Evans Bros. 1948. 21s.

Dr. Talbot Rice's brief survey of Russian icon-painting, illustrated by sixteen colour-plates, usefully supplements the account of the development of the icon schools given in Mr. Cyril Blunt's book on Russian Art, recently noticed in these pages.

Dr. Rice begins his little volume with a consideration of one of the most splendid, and also perhaps the best-known, of all Russian icons—Andrew Rublev's *The Old Testament Trinity*, painted about 1410 only a few years after the Wilton Diptych. These two masterpieces of East and West are inspired by the same religious feeling, and have a kinship also in their pure brilliance of colour and assured composition, and it is clear, as the author observes, that both derive much from early Christian art in the Byzantine world. Indeed, it is the relationship of Rublev's work to Byzantine models which links it to the art of the West, and notably of course to the contemporary Italian school.

Other beautiful icons discussed and reproduced in the book are the eleventh century *Virgin of Vladimir*, an outstanding example of the period and probably a Constantinopolitan product; *Our Lady's Assembly* usually assigned to the fourteenth century, and evidently derived from some earlier pagan Russian work; and a late jewel-like icon of *Tsarevich Dimitri and Prince Roman of Ouglich* which, like so many Russian paintings after the seventeenth century, has obvious Western affinities.

This Penguin book provides the most concise outline of the subject that has yet appeared, and it will be welcomed by students not least for the clear text and excellent quality of the colour-plates.

Mr. Frank Salisbury's name is usually associated with large detailed paintings of ceremonial occasions, such as are more often to be discovered to-day occupying the wall-space of city institutions or provincial galleries than the walls of Burlington House. His critics would probably say that his pictures, acceptable forty or fifty years ago, are now outmoded. His supporters, on the other hand, would doubtless maintain that the artist's integrity, harmonious colour, conventional design, and truth to Nature are attributes which will once again find favour when the more ephemeral manifestations of contemporary art are forgotten.

Mr. Salisbury himself seems to have become conscious lately that he was in danger of repeating himself; and with an enterprise unusual in a veteran painter he has departed from his customary portraits and ceremonial assemblies, if not (as some might have hoped) from his familiar style.

The most exacting commission he has recently undertaken is the illustration of the petitions of the Lord's Prayer; and his seven paintings, unexceptionally printed in five colours and accompanied by explanatory text, have now been issued under Evans' imprint.

It is an inspiring theme but—as the artist is evidently conscious—pictorially almost incommunicable. Occasionally his pictures catch the glow and exhibit the patient skill of a Holman Hunt canvas, but it must be admitted that the artist is by no means always equal to the occasion. The text is felicitously written and the production as a whole is distinguished, though most typographers would probably agree that the title-page and dedication are insipid designs and the lettering should have been set.

The same artist's series of flower-pieces, which have something in common with those of Davis Richter, deserve attention as a pleasing by-product of his art. They were painted, he tells us, in a summer-house at Ivinghoe on the slopes of the Chilterns during a period when the air-raids made work in London impossible. Though he would probably claim that these harmonious compositions represent no more than a painter's method of escape from a hostile atmosphere, such pieces as "Rhododendron" and "Lily and Delphinium" in truth worthily continue a tradition which can be traced at least as far as the Dutch flower painters of the seventeenth century.

The full-page colour plates, "bled off" and interleaved with the text pages, make one curious to study the original paintings, but in the meantime it is clear that the artist has been well served by the block-makers.

The various passages on the flowers reproduced are contributed by Sir William Beach Thomas, well known as a naturalist with a ready pen. If the text strikes one reader as inordinately prosy, that is only because such words as "hybridisers", "floriferous", and "empurple" sound less pleasing to his ear than they may to the botanist's, for whom the book appears to be primarily designed.

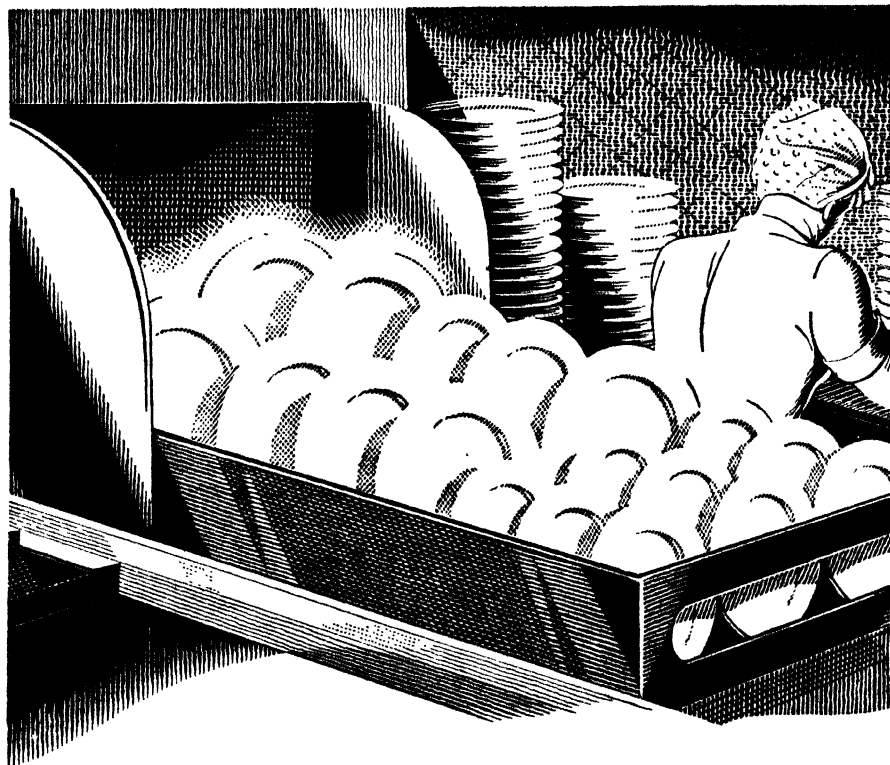
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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4775

FRIDAY, AUGUST 13, 1948

Vol. xcvi

THOMAS GRAY MEMORIAL TRUST

The Council offer the following Awards for the improvement and encouragement of navigation under the Thomas Gray Memorial Trust:

A Prize of £50 for an essay on "The Applications of Radar to Navigation". (The essay should be on elementary lines, suited to the needs of beginners and young seamen, and elaborate formulæ and calculations should be avoided. The text should be aided by simple sketches where possible.) This competition is open to persons of British nationality, who are, or were, on July 1st, 1948, *bona fide* professional seafarers of the British Merchant Navy, serving ashore or afloat.

Further, in recognition of the remarkable skill which is so constantly displayed at sea, an award of £50 is also offered to any member of the British Merchant Navy for any deed which, in the opinion of the judges to be appointed by the Council, is of outstanding professional merit. The period covered by the offer is the year ending September 30th, 1948.

Full details of both these offers can be obtained on application to the Secretary of the Society.

FATS IN THE LIFE OF THE NATION

By Sir JACK DRUMMOND, D.Sc., F.R.I.C., F.R.S.

CANTOR LECTURE

Delivered, Monday, February 9th

"VISIBLE" AND "INVISIBLE" FATS

It is important to have clearly in mind what is meant by fats, when discussing the part they play in our diet. To many people the word fat calls to mind butter, lard, margarine and the obviously fatty parts of meats and bacon. It is fat that can be seen. It is appropriate, therefore, to apply to it the convenient term "visible fat", in contradistinction to other fats contained in food, not so generally recognised as fats, which are designated "invisible".

The latter are by no means unimportant. As we shall see, they provide something of the order of one-half of our total daily intake. A few examples will illustrate the contributions foods usually regarded as not fatty can make to the total. Lean meat contains 6-8 per cent. of fat; cheese, from 4-30 per cent., depending on the quality

of the milk from which it was made; dried eggs, 42 per cent.; rabbit, 5 per cent.; herrings, 10 per cent.; flour 1-2 per cent.; bread, 1 per cent.; oatmeal, 8 per cent. Analysis of diets eaten in this country before the war shows that more than half the total fat consumed was in the form of foods providing "invisible" fat. That, of course, was in the days when a sausage contained 30 per cent. of fat and a good cake as much as 15 per cent.

Before passing to consider the significance of fats in our daily diet we should briefly review the more important facts concerning their behaviour in the body and what is known of their function.

DIGESTIBILITY OF FATS

In his lecture last week, Professor Frazer gave you an account of his investigations of the mechanism of the digestion of fats and their absorption from the intestinal canal. I am more concerned to-day with the broader aspect of digestion. In general it can be accepted that all the ordinary fats we eat, whether "visible" or "invisible", are well digested by the healthy individual. It is true that natural fats are known which, by reason of an unusually high melting point or some other peculiarity, are imperfectly absorbed by the alimentary system, but these are of no interest to us to-day. They occur but rarely in the foods we eat.

An immense amount of experimental work has been carried out on the efficiency of digestion of food fats by the body, but it has provided little to add to conclusions reached twenty-five years ago by C. F. Langworthy⁽¹⁾ and his co-workers, whose pioneer studies in this field showed convincingly that all the important edible oils and fats are assimilated to extents ranging from 90-98 per cent. In other words, they are, for all practical purposes, completely utilised during normal digestion.

ENERGY VALUE OF FATS

Fats are important by virtue of their relatively high energy value. Although the precise calorie equivalence of any individual fat is determined by its chemical structure, the various values are near enough to justify accepting an estimate applicable to fats as a class. That most widely employed is the figure of 9 Calories per g. derived by Atwater; his corresponding figure for both protein and fat being 4 calories per g.⁽²⁾ Fats provide, therefore, more than twice the energy, weight for weight, that proteins and carbohydrates yield in the body.

The high calorie value of fats makes it possible to provide for very high energy intakes without meals being unreasonably bulky. That explains the relatively large consumption of fat characteristic of miners and heavy manual workers under conditions of unrestricted food supply. It also explains why these heavy workers found the war-time diet so unsatisfying and so lacking in sustaining power. But there was something more underlying their complaints.

"SATIETY VALUE" OF FATS

Fats in the stomach tend to retard the passage of food into the upper part of the intestine. Meats, also, have this property to some extent. A meal containing a lot of meat and fat stays in the stomach longer than does one composed largely of vegetables and cereal foods. Rapid passage of food from the stomach is usually

associated with an "empty" feeling and may arouse prematurely the sense of hunger.

We attach importance, therefore, to what is termed the "satiety value" of fats and of meats, because it is related to a feeling of well-being and repletion.

ESSENTIAL FATTY ACIDS

A great deal of experimentation has had as its object to discover whether or not the animal body can live in health without any fat at all in the food. I shall return later to the much debated question of the fat minimum, but I wish now to refer to one curious fact that was revealed by the experiments I have just mentioned. Nearly twenty years ago two American researchers discovered that young rats fed on a diet compounded to exclude every trace of fat that could be removed failed to grow and showed a curious disorder of the skin.⁽⁸⁾ Carrying their investigations further they observed that quite small supplements of certain fatty acids would protect the animals from these abnormal developments.

Three unsaturated fatty acids were found to be particularly potent in this respect. One, linoleic acid, was outstanding. Another, arachidonic acid, was nearly as effective, whilst a third, linolenic acid was a good "runner-up".

It is interesting to note that a very wide variety of other fatty acids, both naturally occurring and synthetic, has been examined but none has yet been found to equal in potency the three whose property was originally revealed by Burr & Burr.

Reference must be made to this discovery of what have come to be known as the "essential fatty acids" because, although their reputation is based almost entirely on the part they are known to play in the nutrition of rats, there is a possibility that they also have a function in the nutrition of man. There is no evidence yet that our well-being depends on the presence of small quantities of one or other of these acids in our food, as it is known to depend on minute quantities of vitamins, but, on the other hand, there are some who have suspected that certain skin disorders had their origin in a deficiency of these acids. To this matter I shall again refer.

FATS IN RELATION TO VITAMINS

Certain natural fats contain fat-soluble vitamins. "Pasture-fed" butter is a good source of vitamin A and its related provitamin carotenoid pigments. Fish liver oils are, as a class, noteworthy for their content of A and D.

But we ought to try to keep the picture in fair perspective. It is too generally assumed that animal fats are good sources of vitamins. In fact, a large proportion of them come low in the scale. Mutton fat and lard are hardly worth taking into account in this respect. On the other hand, some foods we tend to ignore as sources of fat stand high in the list. Cereal germs contain oil rich in vitamin E whilst the small proportion of fat (0.1-0.2 per cent.) that can be extracted from green vegetables is exceptionally rich in provitamin A.

In another respect fats may be of importance in relation to the fat-soluble vitamins. Their absorption by the body is undoubtedly facilitated by the digestion of fats in the gastro-intestinal tract. To what extent this is simply a process depending on partition solubilities is not yet clearly established but an explanation on that basis is widely accepted. It also provides an explanation of the reduced absorption of

fat-soluble vitamins that is caused by the ingestion of "liquid paraffin", an oily substance which for the greater part passes unchanged out of the digestive tract. The practical aspects of absorption of vitamins from diets poor in fat will be dealt with later in this lecture.

FATS AND FOOD UTILISATION

What may prove to be an important aspect of fats as foods has been revealed by interesting studies recently reported by a group of scientists working in the laboratory of the eminent investigator Professor W. B. Forbes⁽⁴⁾ at Pennsylvania State College. Studying animals fed on diets very carefully compounded in respect of protein, fat, carbohydrate and the proportion of calorie derived from each, they have discovered that the efficiency of utilisation of the food, both during growth and after maturity is reached, is increased by raising the proportion of fat. It is not that there is merely a better utilisation of the calories provided by the fat itself. The whole efficiency of utilisation of the food is improved. This interesting revelation does not conflict with the established fact that carbohydrate is a more efficient fuel for the work of the body than is fat.

Having thus briefly reviewed our knowledge of the properties and function of fats as they concern the body and frankly admitted how little we can claim to know about them we now pass to practical aspects of the subject.

HOW MUCH FAT DO WE NEED?

I wish I could answer this question. No other problem gave me so much trouble during the war years as this. Time and time again, as Scientific Adviser to the Ministry of Food, I was asked to state or to determine what could be regarded as the irreducible minimum to which the fat ration could be cut without endangering health, should the food supply situation deteriorate to a very serious extent, as, at times, seemed probable.

It was obvious that further drastic reductions of the fat rations would have a very bad effect on morale, would necessitate eating bulkier and less satisfying meals, would make housekeeping and catering a nightmare and would generally have unpleasant consequences, but there was little evidence one way or another to indicate whether health would be undermined. I cannot say there was no evidence, because one had to bear in mind that diets of relatively very low fat content are habitually eaten in many parts of the world without having any adverse effect on health. For example, many families in the Dutch East Indies, whose selection of food is not restricted by poverty, live on diets providing on an average from half to one oz. of fat a day. These people are well-nourished and healthy.

It seemed to me at that time, and I still hold the opinion, that with so little physiological knowledge to rely upon one was justified in attaching more importance to psychological considerations. Food habits are a vitally important part of our social structure and they are deeply rooted in our history.

HISTORICAL EVIDENCE.

When we look at the past centuries we find clear evidence that a diet rich in fats has long been a characteristic of all but the poorest people of our country. The

peasant of medieval times lived to a large extent on a simple diet of bread, peas, milk and cheese. Even his daily intake of fat would have been of the order of 2 ozs. without eating much "visible fat". But the meat-eating lords and merchants of the fifteenth and sixteenth centuries ate well. Their diet gave them something of the order of 2 ozs. of "visible" fat a day, and another 2-4 ozs. in other forms. A hospital diet of the late seventeenth century provided 4 ozs. a day of fat, of which 2 ozs. was butter.

From those times onwards there is a wealth of evidence to show that all but the poor, prison inmates and other unfortunates enjoyed food that provided 4 ozs. or more of total fat a day, about half of which was recognised as fat.

Now, if we reduce those quantities to a calorie basis we derive the interesting and significant result that with a daily ingestion of food providing about 3,000 calories about 30 per cent. was derived from fat. The proportion would, of course, tend to be higher among the wealthier classes, but the figure I have given can be taken as a good average for all except the under-nourished. If you bear in mind that, apart from the introduction of vegetables in the eighteenth century, the broad features of our food habits have remained much what they were three or four centuries ago, you will understand why fats occupied the same relation to other foods in the pre-war years as they did long ago.

When Sir John Orr made his pioneer dietary surveys⁽⁵⁾ in the latter part of the depression of the 'thirties he found that the best-fed families (Group VI) were eating about 5 ozs. of fat a day, corresponding to 38 per cent. of the total calories, whereas the least well fed (Group I) consumed just half that amount, or about 28 per cent. of their smaller total intake of energy.

In other words, food habits and meal patterns even among the poorer people, led to a choice of foods that provided about 30 per cent. of the energy in this form of fat. Consideration of facts such as these is the only foundation we have for expressing any view about the quantity of fats we need in our daily diet. This is widely recognised among nutrition experts. In the United States of America, where food habits are, in general, not greatly different from what our own were in happier days, an Expert Committee making an authoritative pronouncement on this issue said, "Fat allowances must be based at present more on food habit than on physiological requirements . . . there are several factors that make it desirable that fat be included in the diet to the extent of at least 20 to 25 per cent. of the total calories".⁽⁶⁾

You will not be surprised, therefore, if I tell you that my reply to Lord Woolton at those critical times during the war, of which I speak, was to the effect that there is no known *physiological minimum* requirement for fats, but that one must recognise a *psychological minimum*, that one could accept as representing the smallest quantity of "visible" fat (*i.e.*, butter, margarine, cooking fat), because the general public recognises no other, that enabled the housewife and caterer to provide tolerable meals. At that time, I believed we had already reached the psychological minimum with total fat rations providing about 1 oz. a day. I was convinced that any reduction below that level would make the task of feeding the family and the workers so difficult that inevitably morale and industrial output would be impaired, but there was no fear in my mind that health would be affected.

SUBSISTENCE ON LOW-FAT DIETS

The war period provided a wealth of information about the effect of under-nourishment of one type or another.

In almost every country engaged in the war the consumption of fats fell, but in some instances the reduction became very serious indeed. The case of the Western Netherlands provides an interesting example worthy of our attention.⁽⁷⁾ From the Spring of 1941 the quantity of fat provided by the ration for the ordinary consumers slowly and steadily declined until the grim starvation period began in late 1944. From then, until Allied liberation came in May, 1945, the rations provided no more than a trace of fat.

	<i>oz. Fat (approx.).</i>		
May, 1941	1.5
November, 1941	1.2
March, 1942	1.1
August, 1942	1.1
November, 1942	1.1
February, 1943	1.1
April, 1943	0.9
July, 1943	0.9
February, 1944	0.8
April, 1944	0.75
September, 1944	0.7
November, 1944	0.7 (beginning starvation period)
December, 1944	0.5
January, 1945	0.14
March, 1945	0.11
April, 1945	0.15
May, 1945	1.0 (liberation May 6th)
June, 1945	2.4

For six months, hundreds of thousands of the people of the larger towns were obliged to subsist on food supplying a mere 3-5 g. of fat a day. When Western Holland was liberated and it was possible for Allied nutrition survey teams to operate, a very comprehensive and careful study of the condition of the town populations was made. A great many cases dying from starvation were found, hunger œdema was widespread, whilst everywhere one saw the severe emaciation and the debility of the chronically underfed. But, there was little more to see. Vitamin deficiency disorders were distinguished by their rarity, whilst nothing was detected that could be related in any way specifically to the long deprivation of fats.

Actually, this observation did not cause surprise because experience gained in French and Belgian cities after their liberation had given rise to a strong impression that there are no readily recognisable signs or symptoms associated with prolonged subsistence on diets containing little fat.

On many occasions we were assured that a curious dry, scaly and cracked condition of the skin very commonly seen among the townspeople, particularly among school children, was attributable to lack of fats, but no definite evidence in support of this assertion was ever obtained.

The cause of this mild disorder was not discovered. It did not appear to respond specifically to fats but it gradually became less common as the food supply and

other conditions improved. Nothing would shake the ordinary people's firm conviction that lack of fats was responsible, although the weight of expert opinion favoured the view that several factors played a part, general under-nourishment affecting the maintenance and repair of the protein structures of the skin, lack of proper cleansing facilities, secondary effects of the all too common scabies, impetigo and other skin infections and the use of crude abrasive and surface-active soap substitutes.

None of the vast mass of information on malnutrition derived from war-time experience threw any light on the open question whether or not man's proper nourishment requires the provision of essential fatty acids. The superficial resemblance of the skin condition I have mentioned to that shown by rats deprived of linoleic acid was often a matter of comment, but, as I have remarked earlier, this dry, scaly human skin disorder did not respond specifically to fats. Another argument against favouring a relationship comparable with that observed in rats is based on the fact that small though the quantity of fat in the meagre Western European town rations was its character made it probable that essential fatty acids were present to a sufficient extent.

Before leaving the subject of nutrition on diets poor in fat it is necessary to refer again to the function of fats in facilitating the absorption of vitamin A and more particularly its provitamins. There is ample evidence that carotene is much more efficiently utilised by the animal body when administered together with fat. It will be sufficient to illustrate this fact by referring to the observation on human subjects made in the course of a series of very carefully conducted experiments organised by the Vitamin A Sub-Committee of the M.R.C.

When carotene was administered in arachis oil or margarine an average of about 72 per cent. was absorbed during digestion in the intestine. When, however, the carotene was given in the natural forms of cabbage, spinach or sliced carrots the percentage absorbed fell to 25-40⁽⁸⁾.

On ordinary mixed diets, containing a fair proportion of green vegetables, this fact is of no great significance for the body gets all the provitamin A it needs. The question arises whether there is an element of danger in impaired absorption of carotene when the food contains very little fat.

At one time we were inclined to believe that the war had provided evidence that such a danger can arise. Analysis of the food consumption data for groups of individuals in Marseilles during the war years showed surprisingly large intakes of carotene. The shortage of other foods enormously increased the consumption of tomatoes and green vegetables. With such large potential supplies of vitamin A it was surprising, therefore, to be informed by Professor A. Chevalier, of the Institut National d'Hygiène of Paris, that examination of the people had revealed a high incidence of defective dark adaptation, suggesting widespread mild avitaminosis A among the people. This he ascribed to faulty absorption and utilisation of carotene, resulting in part from the paucity of fat in the diet.⁽⁹⁾

It transpired that the French expert had accepted as evidence of vitamin A deficiency data that did not justify such an interpretation and it is very doubtful whether his contention now stands.⁽¹⁰⁾ Whilst it is undoubtedly true that fat facilitates the absorption of the fat-soluble vitamins, there is not, so far as I am aware,

any indication from war-time records that subsistence on diets poor in fat accelerated the appearance of signs of a deficiency or aggravated them.

OUR FAT SUPPLY

It will surprise many of you to be told that we are eating, as a nation, to-day, only about 15 per cent. less fat than we had in the pre-war period. That remark never fails to arouse incredulous and, indeed sometimes, angry comment, but it is none the less a true statement. If we estimate that total fat content of the food moving into civilian consumption (at the retail stage) for each year since 1939 we derive the figures in the following table.⁽¹¹⁾⁽¹²⁾.

<i>Period</i>					<i>Total fat g. per head, per day</i>
Pre-war	..	..	..	..	130
1940	..	..	..	..	121
1941	..	..	..	..	113
1942	..	..	..	..	119
1943	..	..	..	..	115
1944	..	..	..	..	124
1945	..	..	..	..	115
1946	..	..	..	..	112
1947 (provisional)	..	..	..	..	110

It must be made clear that these quantities of the order of 4 ozs. daily include both "visible" and "invisible" fat and cover not only rationed foods but supplies for special priority classes, canteens, restaurants; in other words, the whole food supply of the country.

There is, of course, wastage in market, shop and home to allow for, but even then the total quantity of fat actually eaten is by no means as small as very many people imagine it to be.

Data that will perhaps make a more convincing appeal can be derived from examining the vast mass of records collected by the Ministry of Food in making its family consumption surveys operated since 1942. The figures given in the next table show estimates derived from actual records of food purchased and of changes in food stocks in hundreds of "working-class" and "middle-class" homes.⁽¹³⁾

<i>Total fat per head per day</i>					<i>g.</i>
"Working-Class households"	..	1945*	..	..	82.0
	..	1944	..	..	88.4
	..	1943	..	..	85.2
"Middle-Class households"	..	1945	..	..	80.1
	..	1944	..	..	90.2

These figures do not include the fat as food eaten elsewhere than in the home (snacks, restaurant or canteen meals), so they are lower than those which would represent actual consumption.

The conclusion cannot be evaded that, small as our rations of "visible" fat (butter, margarine) appear to us, the total *per capita* quantity of fat, in one form or another, coming into our homes is of the order of 3 ozs. a day. Those who eat meals

* I have not comparable data for later years, but the general picture is obviously not greatly changed from that represented by the figures for 1943-5.

away from home gain additional fat, bringing the total up to an over-all figure not far removed from the 4 ozs. or so that analysis of the global statistics provides.

I should, of course, remind you that an analysis of the national food consumption does not go below the family level. *Per capita* figures carry no implication that, in fact, every member of the family receives those quantities. The distribution of food inside the home is a particularly difficult field of nutritional study but, in general, I am presenting the broad national picture to-day.

It may well be asked, why if fat consumption is not greatly reduced we seem to be so much poorer off than we were before the war in respect to fats. To a large extent the explanation is found when conditions before the war, when expenditure on food was, in the main, determined by income, are compared with those that now prevail as a result of an efficient and equitable system of rationing and distribution.

Referring again to the disparities of consumption Orr revealed between the groups of differing incomes in 1935, I will remind you that the poorest group (I) of families ate about $2\frac{1}{2}$ ozs. of fat daily, of which a little more than half was "visible fat". In contrast, the best nourished group he studied (Group VI) consumed about 5 ozs. of fat daily, of which also about half was eaten in the form of food providing "visible" fat.

To-day, we have a far more equitable distribution of food, the system introduced and operated by the Ministry of Food being based primarily on nutritional requirements. Having in mind the *per capita* figures I have given as representing the broad outlines of the situation to-day, it will interest you if I give you an idea of the range of individual consumption of fat, in all forms, revealed by detailed studies of the food eaten by representative groups of people. The studies have been reported by Dr. M. Pyke, of the Ministry of Food.⁽¹⁴⁾⁽¹⁵⁾ Among groups of "heavy workers" (sawmill operators, miners and steel-rolling mill workers) he found fat intakes, usually proportionate to the calorie value of the diet, ranging from about $2\frac{1}{2}$ ozs. daily to nearly $6\frac{1}{2}$ ozs. On the whole, this type of worker appeared to be getting from $4\frac{1}{2}$ to 5 ozs. a day.

At the other end of the scale came old people, living either at home or in institutions. The former class is one about which there is much concern because it is so difficult for them to cope with the task of getting their daily food. But when Dr. Pyke examined carefully individual cases it was found that the average intake of fat for the first-mentioned category was about 2 ozs. a day. Those living in almshouses or institutions fared better with an average figure nearer to 3 ozs. daily.

BUTTER AND MARGARINE

The prejudice against margarine, so strong twenty years ago is now, to a large extent, a thing of the past. It was founded partly on the bad reputation that the poor quality of margarine established in its early days and, partly, on a deep-rooted distrust of food substitutes of any kind.

The amazing advances in the technology of margarine during the period between the two world wars gave us a product of high palatability and public acceptance before the last war began. When, soon afterwards, the Ministry of Food enforced the enrichment of all ration margarine with vitamins A and D, a product was provided that seemed in all respects to be a satisfactory substitute for butter.

Its edible quality was good, it was well digested and its nutritional value was much the same as that of the natural product.

The recent war period put the margarine manufacturers to a very severe test. Oil supplies were irregular and their quality often was below that of peace-time standards. It was impossible to plan production ahead in the knowledge that certain preferred blends of oils could be used. The best use had to be made of whatever supplies could be obtained under exceedingly difficulty conditions. In spite of these and many other formidable difficulties the production of a material of good quality was consistently maintained throughout the war. A very great achievement stands to the credit of the margarine manufacturers.

There remain two doubts in some minds about margarine as a human food. One concerns its digestibility, but war-time experience has completely failed to substantiate the claim that certain individuals were constitutionally unable to digest margarine. It is significant that a high proportion of such claims were made by elderly ladies in good circumstances, living sheltered lives with ample opportunity to ponder on the vagaries of their digestive systems. I believe I am right in stating that not one single case of true specific sensitivity to margarine was detected during the war.

The second doubt one sometimes encounters is in regard to the nutritional equivalence of butter, on the one hand and vitamin-enriched margarine on the other. The view that butter is and must be superior to any substitute is still cherished by some of the advocates of a 'natural' diet, whatever that may mean.

Until recently, one could be emphatic in stating that nothing had emerged from a very large amount of experimental work to indicate that butter has nutritional merits that enriched margarine does not possess. All the evidence suggested that weight for weight they were interchangeable in the diet without in any way affecting the nutritional state. This view, based on laboratory studies in many parts of the world was, of course, deeply unpopular in countries where the dairy interests were strong. At least one senior member of the Scientific Staff of an American University in a "dairy state" lost his job for having the temerity to support this heresy in public. There is, in fact, a long and rather sordid story concerning the efforts made in the past by the butter-producing interests to hamper the development of margarine production and its sale in attractive form to the public. Much of it is now old history and better forgotten.

But, in recent years the old controversy among scientists whether butter is more nutritious than margarine has been re opened. A group of investigators at Madison University, Wisconsin, reported in 1943 that butter was superior to certain vegetable oils as a source of fat in the diets of young rats when the chief carbohydrate in the food mixture was lactose.⁽¹⁶⁾ Of course, these were curiously artificial conditions and the applicability of the conclusions derived from these experiments seemed, to most critics, very restricted.

A more practical series of trials in England extending over a period of three years failed to reveal any significant difference between butter fat and other fats, including margarine.⁽¹⁷⁾ However, the indications derived from the Wisconsin investigations that under special conditions a difference can be revealed has been reinforced by work carried out during the war years in Professor Jansen's laboratory at Amsterdam.

He and his associates found that "summer" butter fat was superior to vegetable fats when forming part of a diet for rats giving "optional growth". The difference was not detected when the food mixtures contained wheaten, rye, or potato flour.⁽¹⁸⁾

Following up this lead, Professor Jansen has identified the unit of butter fat responsible for the superior value that can be thus detected. It appears to be vaccenic acid, an isomer of oleic acid, previously known as a constituent of butter fat.⁽¹⁹⁾⁽²⁰⁾

It is difficult to put these discoveries into their proper perspective in regard to problems of practical dietetics. To me, it appears that the differences are so small and require the imposition of such artificial conditions for their detection, that they are likely to remain of purely academic interest. I see no reason apparent yet for thinking that their discovery will modify the view widely accepted in expert circles that butter and adequately vitamin-enriched margarine are nutritively interchangeable.

NEW SUPPLIES OF FATS

Natural Fats.—It is important to bear in mind that there is an acute shortage of fats throughout the world. Most of the great sources of tropical fats, palm oil copra and ground nut oil, are still producing much smaller quantities than before the war, partly because a lack of consumer goods makes the natives disinclined to collect raw material, partly because it takes a long time to rebuild a complicated industry and trade that was wrecked in many areas to a large extent by the upheaval of the war. Other sources of raw fats that were available to us before the war have dried up entirely, so far as we are concerned. India no longer exports edible oils. But, even if these sources of fat were as productive now as they were before the war there would still be a big world shortage, so great has become the demand for fats.

As I see the problem, the only real solution, although it necessitates taking a very long-range view, is rapidly to push ahead with the development of ambitious undertakings in the tropical belt of the world, similar in character to the ground-nut scheme that our Government has had the courage and initiative to launch.

The potential productivity of the vast tropical belt is prodigious, if the enormous tasks of dealing with disease, infestation, sanitation, fertilisation and land conservation can be successfully tackled, as I am confident the pioneer experimental attack in East Africa will demonstrate. Such developments will provide not only the fat so greatly needed for human use but enormous quantities of animal feeding stuffs with which to increase the production of bacon, meat, poultry, milk, butter and cheese. But, as I have remarked, this is a long-range view.

It will be asked whether there is any alternative likely to bring about an increase in the supply of fats during the next two or three years. There is a possibility that there may be a steady, if slow, improvement. The supply of tropical fats will, I think, tend to get a little better as conditions in the producing areas gradually return to what they were before the war and there is also the hope, perhaps a rather slender one, that food for live stock will not be as restricted in the next year or two as it has been. Production of whale oil is also on the up-grade.

So much, then, for the supply of ordinary natural fats, but, as we should consider every possible approach to the problem, passing reference should be made to other

potential sources of supplies. There are two directions in which much exploration has been undertaken. In both the Germans were the pioneers.

Fats by Fermentation of Sugar.—During the first world war and, again, for a short time in the period between the two wars, the Germans studied the production of fat by micro-organisms, such as *Endomyces vernalis* and *Oidium lactis*, that grow readily in simple solutions containing sugar as the chief nutrient. From the dried organisms separated after the fermentation is completed from 20–30 per cent. of an edible fat can be extracted. The process has not been operated on an industrial scale but it is clear from what is known of its character that it would be uneconomic as a means of producing fat for food.

The yield of calories in the form of fat from the calories originally present in the culture fluid as glucose is too small to justify such a process being developed under conditions of general food shortage.

Synthetic Fats.—Scientific ingenuity and achievement were never better illustrated than by the remarkable success with which the Germans developed the production of petrol on a vast industrial scale from brown coal and other similar starting materials. As an off-shoot of this enterprise a process was devised for catalytic conversion of hydrocarbons to fatty acids. The resulting product was at once found suitable for preparing soap, but it was not, at first, thought practicable to attempt to use it for making an edible fat. However, a trial was made during the course of the war. The purified mixture of fatty acids, yielded by the Fischer-Tropsch process, was converted into glycerides and the resulting product was further refined to produce a fat, resembling a soft lard.

It was found to be digestible by a variety of animals and to be free from any harmful effect on them.⁽²¹⁾ Trials were then extended to human subjects, and, again, results regarded as very encouraging were reported, both in the case of healthy individuals and of invalids.⁽²²⁾

The fat was then used for the preparation of margarine. I have not been able to ascertain what was the extent of its production but, certainly, during the latter part of the war the edibility of this type of margarine was being investigated on quite a large scale.

Reading the German reports on this product one has a strong impression that the scientists concerned were straining themselves to impress their Führer. The merits of the new synthetic food were over-emphasised, whilst its deficiencies, which as we shall see were not unimportant, were dismissed in an unscientific and far from impartial manner.

This synthetic margarine had several disadvantages. Its texture was poor and it had a very slight but perceptible flavour recalling its origin. These defects might have been overcome in time, but the chief objection to the product as an edible fat for human use was based on a fundamental property, the significance of which could not be evaded, no matter how the German scientists who were interested in the development of the new food tried to do so.

The natural edible fats are composed of mixtures of glycerides of fatty acids, all of which possess carbon chains containing an even number of carbon atoms. A large proportion of the naturally occurring fatty acids is represented by the C¹⁶ and C¹⁸ groups.

The animal body metabolised even-carbon atom acids with ease, but its oxidative mechanisms are not adapted to deal effectively with units composed of chains of uneven numbers of carbon atoms. By its origin from a mixture of hydrocarbons of even- and odd-carbon atom chains the synthetic margarine contained both types of acid present, as the following figures show, in approximately equal proportions.

*Fatty Acids in German Synthetic Margarine**
Number of C atoms in acid. Per cent. present in fat

C ₁₀	6
C ₁₁	6.2
C ₁₂	12.4
C ₁₃	11.6
C ₁₄	10.0
C ₁₅	10.0
C ₁₆	8.3
C ₁₇	9.2
C ₁₈	17.8
C ₁₉	8.5

Nearly half the fatty acids being of odd-carbon acid constitution, a fat of this type could not possibly have a food value in the body approaching that of an ordinary edible fat.

To that formidable objection there is not, so far as I am aware, any answer, but the possibility of saving fats for edible use by extending the use of synthetic fatty acids for soap manufacture is one that should carefully be examined.

* Results of an analysis of German Synthetic margarine "Prima" carried out by Messrs. Unilever on material I obtained from Germany.

I am indebted to Dr. H. J. Channon for a report on this sample.

Ref. No.

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THE METABOLISM OF FATS

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CANTOR LECTURE

Delivered, Monday, February 2nd

Fats normally constitute one-sixth part of a normal man's diet, and they provide over 30 per cent. of the total energy liberated by combustion. Included with the fats are sterols and phosphatides, in addition to fatty acids and glycerol esters. Many functions have been ascribed to these dietary fats. Thus, sterols and phosphatides are necessary structural units for the body cells, especially in association with protein. Many hormones and some vitamins have a basic sterol structure. Some unsaturated fatty acids, such as linolenic acid, are said to be dietary essentials, since they cannot be synthesised in the body. The main function of fat in the diet, however, is to supply energy, which is achieved by the eventual breakdown of triglycerides. Most of the dietary fat is in the form of triglycerides. In the time at my disposal I propose to confine myself to the consideration of the digestion, absorption and metabolism of triglycerides.

The chemical structure of a triglyceride is illustrated in Fig. 1. It will be seen that it consists of three fatty acid molecules attached to a glycerol. The length of the

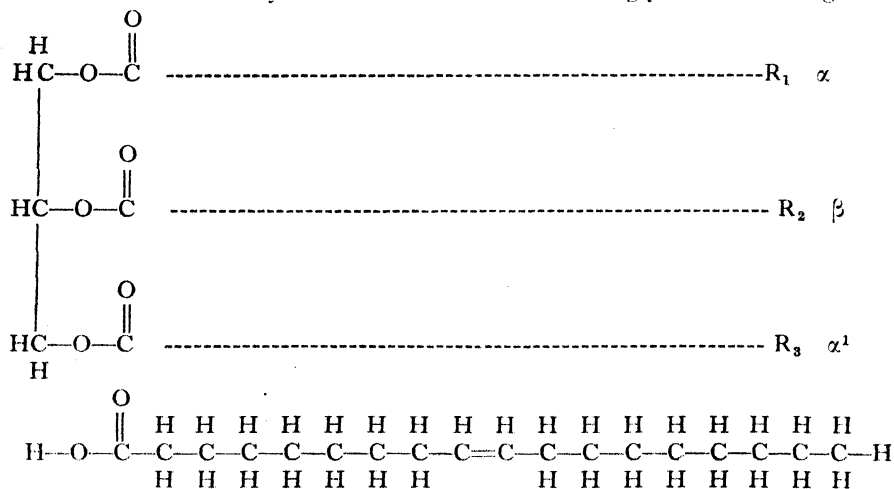


FIG. 1.—Diagrammatic representation of a triglyceride molecule. R_1 , R_2 , R_3 represent fatty acid chains. Oleic acid shown below

carbon chain, the degree of saturation of the fatty acid, and other characteristics, may, of course, be varied. Simple triglycerides, in which all the fatty acids are the same, do not occur commonly in nature. In the natural mixed triglycerides two of the fatty acids (α and α^1) are the same, but the middle one (β) is different. Since the chain length of the fatty acids can vary, from 2 carbons to 20 or more, and the number of double bonds from zero to 4 in each fatty acid chain, it is clear that the properties of triglycerides may vary considerably.

The general problems of the digestion, absorption and metabolism of triglycerides

are indicated in Fig. 2. It may be seen from this diagram that we shall have to consider what happens to triglyceride in the intestinal lumen, how it passes through the outer border of the intestinal cell, what happens to it inside the intestinal cell, and how it passes through the inner membrane into the corium of the villus. We must then discover how the fat is removed from the intestine, how it is conveyed in the blood stream, and what its ultimate destination and fate may be.

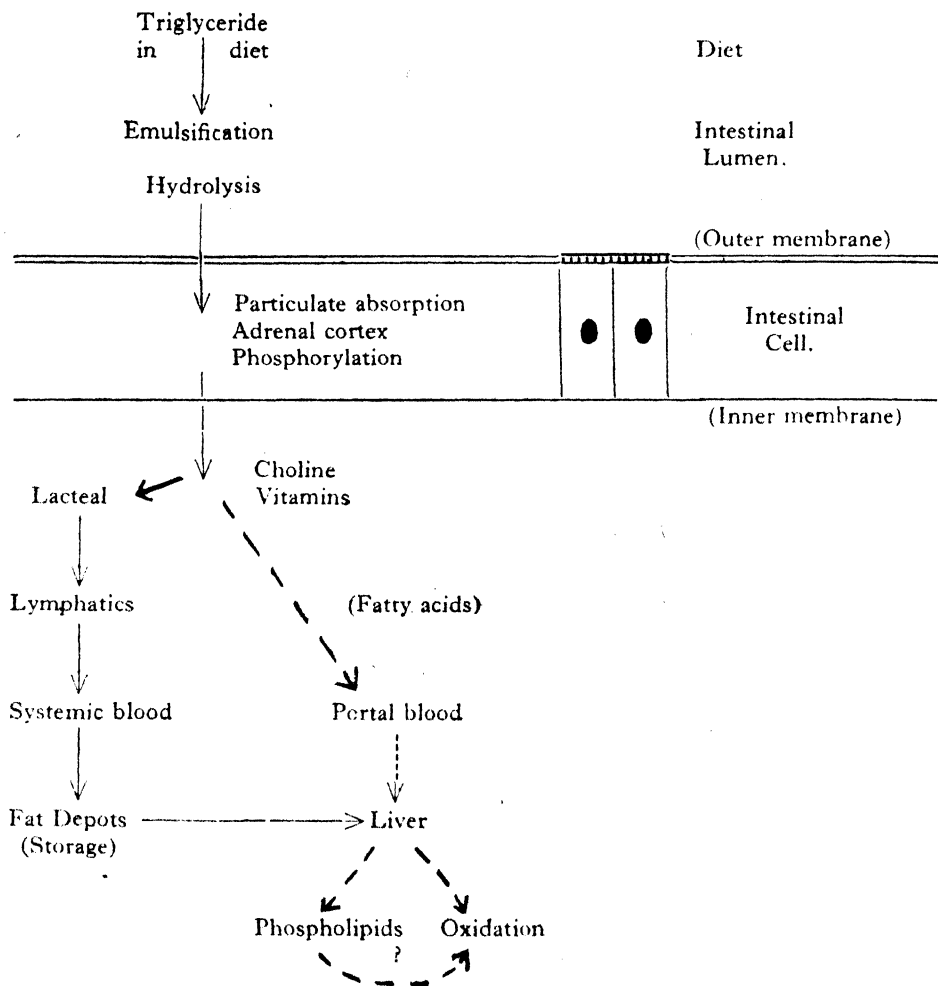


FIG. 2.—Triglyceride absorption and metabolism. Scheme indicating some of the main points requiring discussion. Continuous line shows pathway for triglycerides

In the first place triglyceride is finely dispersed in the lumen of the upper part of the small intestine. This emulsification is spontaneous, giving particles less than $1/20000$ th mm. in diameter. The reaction of the intestinal contents in the upper two-thirds of the intestine is acid, and fine emulsification of triglyceride under such conditions is not easily achieved. The intraluminal emulsification of fats has been attributed to the action of bile salts, or the presence of soaps. If, however, the

various possible factors are investigated singly, or in double or treble combination, under conditions similar to those prevailing in the intestinal lumen, only one system can be shown to be effective. This effective system is the triple combination of bile salts, fatty acid and monoglyceride. Each component contributes to the emulsifying action, the monoglyceride causing a marked lowering of interfacial tension, and the

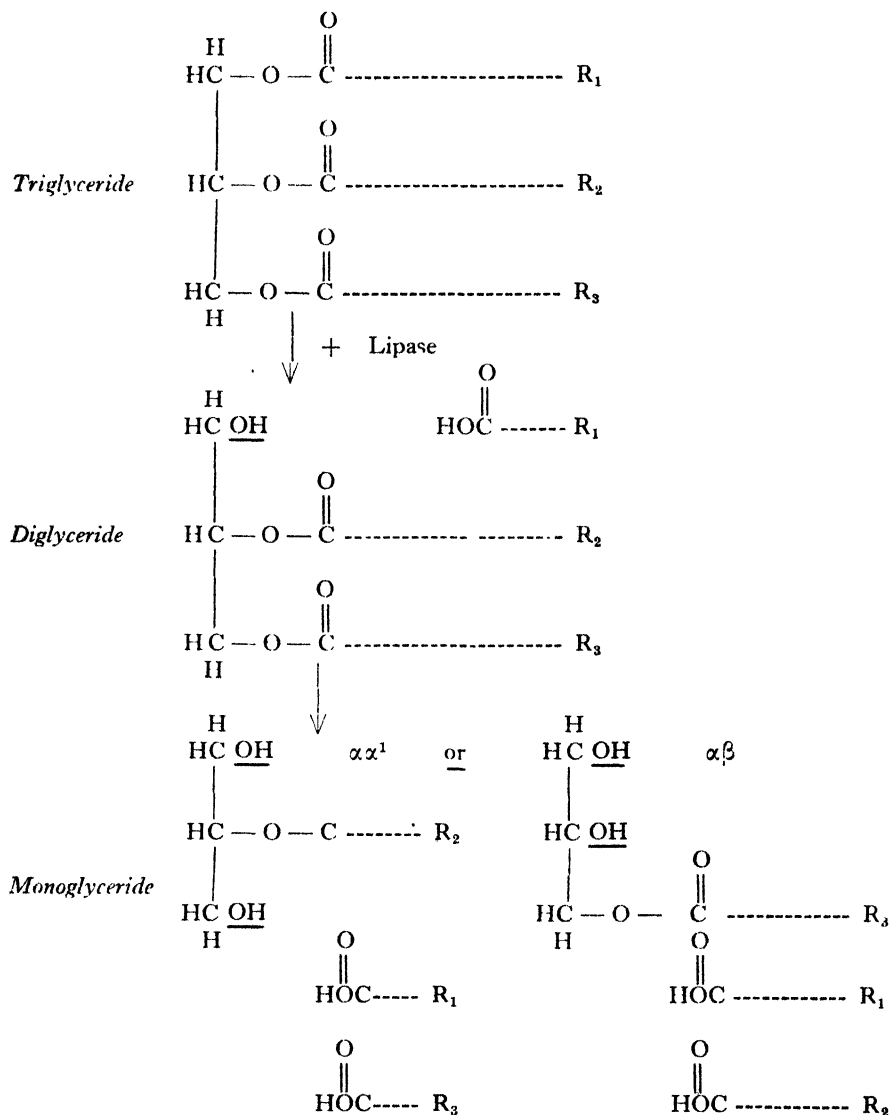


FIG. 3.—Diagram illustrating the formation of di- and mono-glycerides from triglycerides. The free OH groups underlined are shown by determination of acetyl value. The adjacent OH groups in monoglyceride can be titrated with per-iodic acid

fatty acid forming a complex with the bile salt, which provides the necessary charge on the particle, even in the presence of acid.

If pancreatic lipolysis is studied over the first five hours, which is the important period biologically, it can be shown that the fatty acid molecules are not liberated from the glycerol simultaneously, but seriatim, as illustrated in Fig. 3. Thus, diglycerides and mono-glycerides are formed during lipolysis, as shown by the alteration in acetyl value of the glyceride fraction and by the separation of di- and mono-glycerides by chromatography or other means. If the material present in the lumen of the intestine during fat absorption, in rats or human subjects, is removed and subjected to analysis, the presence of mono- and di-glycerides can be demonstrated in adequate quantities for emulsification. It appears that hydrolysis of triglyceride provides two of the three essential components of the intestinal emulsifying system. Further confirmation of the importance of these three components is afforded by studies of the intraluminal changes in human subjects with defective fat absorption. A special intestinal tube is passed by mouth into the small intestine. When the tube is in position, the bag at the far end of the tube is inflated until it obstructs the passage of intestinal contents, which consequently accumulate above the inflated bag. The tube has a second lumen, through which this accumulated material can be withdrawn. If such a tube is used, fat can be fed, and the changes which this fat undergoes in the small intestinal lumen can thus be studied. In all normal subjects, and in many types of defective fat absorption, intraluminal emulsification is quite normal. If, however, there is a lack of bile salts, as in cases of obstructive jaundice, emulsification is defective. Lack of emulsification has also been observed in cases of chronic pancreatitis, in which lipolysis does not occur in the upper part of the intestine. In these two groups, emulsification could be obtained in the samples by the addition of bile salts or lipase respectively. It must therefore be concluded that the fine emulsification of triglyceride in the small intestinal lumen is basically dependent upon the triple combination of bile salt/fatty acid/mono-glyceride.

The second change which triglyceride undergoes in the lumen is hydrolysis. As already discussed, there is evidence that triglycerides are not rapidly broken down to glycerol and fatty acid, but that intermediate di- and mono-glycerides are formed, and that these substances are of physiological importance. It is, however, frequently stated that conditions in the intestine ensure rapid and complete hydrolysis of triglyceride. Such statements are not in conformity with the facts. It is generally agreed that hydrolysis of triglyceride comes almost to a stop when about 30 per cent. of the contained fatty acids have been liberated. It has been suggested that this is a normal equilibrium point, and that rapid hydrolysis will occur if the reaction takes place in the intestinal lumen, where the end products can be removed. It can be shown, however, that this is not a normal equilibrium point, and that the law of mass action should not be applied in this way to a reaction occurring in two phases. If one considers the hydrolysis of triglyceride, it is clear that the fatty acids which are formed will tend to accumulate at the oil/water interface, where they will compete with other end products. The accumulation of these end products at the interface will interfere with the continued action of lipase. This can readily be demonstrated by adding fatty acid to the triglyceride before the addition of lipase, when it can be shown that the addition of long-chain fatty acids causes an inhibition of hydrolysis. It is clear that the absorption of these end products by the intestinal mucosa in molecularly dispersed form can occur only if these substances are

transferred from the oil/water interface into the water phase. Thus, the determining factor in the restriction of hydrolysis is the removal of end products from the oil/water interface. These problems must be considered before any question of intestinal absorption can arise.

The removal of fatty acids from the interface appears to be dependent upon the nature of the fatty acid and the reaction of the environment (Fig. 4). Thus, short-chain fatty acids are more easily removed from the interface than long-chain compounds, especially in an acid environment. If the reaction is alkaline, however,

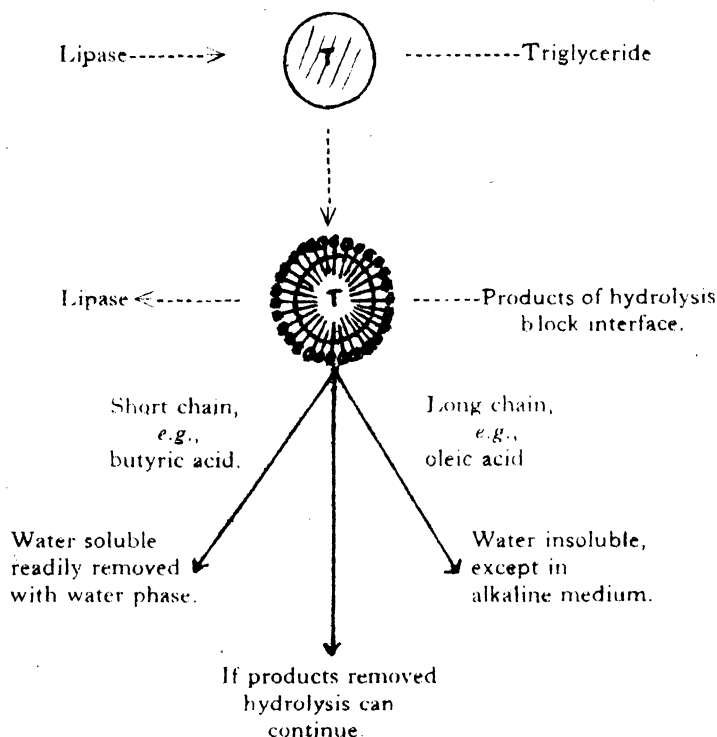


FIG. 4.—Diagram to illustrate restriction of hydrolysis of triglyceride due to blocking of the interface. The interface will be readily cleared in the case of tributyrin. Long-chain fatty acids, however, will be removed only in an alkaline medium

the transference of long-chain fatty acids into the water phase is facilitated. Some evidence indicating the importance of pH, and the points of differentiation between the absorption of tributyrin and of long-chain triglycerides, will be discussed later. Finally, it must be remembered that the optimum pH for pancreatic lipolysis is 7.8, and the activity of the enzyme is markedly reduced at pH 6.5, which is the normal reaction of the intestinal contents. Thus, the environmental conditions in the upper part of the small intestine are unfavourable to lipolysis. It may be concluded, therefore, that restriction of the hydrolysis of long-chain triglycerides might be anticipated in the upper two-thirds of the small intestine. Lipolysis may be more rapid and complete in the lower part of the ileum, or under special conditions. The hydrolysis of short-chain triglycerides is probably unrestricted in the small intestine.

Since at least 95 per cent. of the amount of fat ingested is normally absorbed within a few hours, it seems certain that fatty material must pass through the outer border of the intestinal cell as unhydrolysed, or partially hydrolysed triglyceride. It is agreed that most of the fat during absorption is present in the lumen, in the cell, in the villus and in the chyle as triglyceride (Fig. 5). According to all the theories of fat absorption which have been suggested, triglyceride was thought to pass unchanged through the inner membrane of the intestinal cell and through the wall

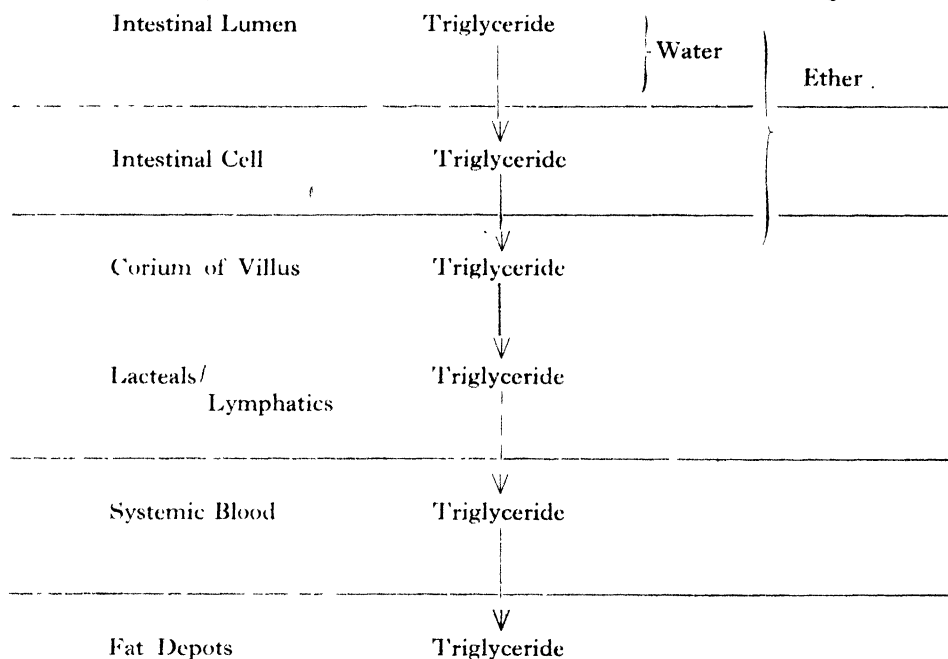


FIG. 5.—Showing sites where triglyceride can be demonstrated to be predominant
 Note :—Ether extracts triglyceride from lumen and cell, water removes from lumen only

of the central lacteal. There seems, therefore, to be no *a priori* objection to the passage of unhydrolysed triglyceride through the outer membrane of the cell.

To study this problem, we have devised new methods for determining the exact amount of fatty material which has left the lumen, and its precise distribution in the intestinal wall while it is retained there. Workers on these problems in the past have almost invariably used ether to wash out the residual fat from the intestinal lumen. This also removes the fat from inside the cells, and from other parts of the villus. It also hardens the tissue and makes it useless for histological work. We wash out with water, which is quite as effective as ether since the fat is present as an oil-in-water emulsion. The fat is left in the cells and the material can be used for histology, so that detailed biochemical and histological studies can be made in the same animal.

There are various ways in which unhydrolysed fat might pass through the outer membrane of the cell, but the only one which will be considered here is its absorption in particulate form. We have already described how the triglyceride is finely dispersed in the intestinal lumen into minute particles of less than 0.5μ diameter.

It has been shown by Dr. J. R. Baker,⁽¹⁾ of Oxford that the so-called outer membrane of the intestinal cell is penetrated by fine canals, which run at right angles to the surface. He has succeeded in cutting sections which show these fine canals either in longitudinal or in transverse section. He considers that they might allow the passage of particles about 0.3μ in diameter. The third group of experiments on particulate absorption are concerned with the administration of paraffin. Paraffins are hydrocarbons which are not hydrolysed in the intestine, and they are consequently not normally emulsified. They are frequently used medicinally as lubricants. When they are administered as crude oil, or in the form of relatively crude emulsions, no absorption occurs. If, however, a special emulsifying system is provided, and the paraffin is mechanically emulsified, so that the particles are less than 0.5μ in diameter, and if this very finely dispersed emulsion is injected into the duodenum of a rat, passage of the paraffin through the outer membrane of the cell can be demonstrated, both biochemically and histologically. The amount of paraffin absorbed is exactly comparable to the amount of fatty material absorbed from an olive oil emulsion of similar dispersion, administered in the same way. To allow them to pass through the outer membrane of the cell, particles must be less than 0.5μ in diameter and negatively charged.

If particulate absorption is a possibility, we must also consider the forces which carry the negatively charged particles through the membrane. A relationship between the passage of small, negatively-charged particles through membranes and the passage of water and electrolytes, has been described by Professor T. Teorell,⁽²⁾ of Upsala. It is of some interest, therefore, to consider whether any such relationship can be observed with regard to fat absorption in animals. Professor Verzar,⁽³⁾ of Basle, first reported the depression of fat absorption following removal of the adrenal glands. He ascribed this effect to a consequent depression of phosphorylation. It has, however, been shown that adequate salt therapy is as effective as corticosterone in bringing back the fat absorption to normal. Using labelled phosphorus, it has also been demonstrated that phospholipid formation in the intestinal cell is not altered following complete removal of both adrenal glands. It has, however, been amply confirmed that adrenalectomy does depress absorption, but it has also been shown that it does not affect fatty acid absorption, nor does it alter the absorption of tributyrin. It would seem that the adrenal cortical hormone affects the absorption of long-chain triglycerides, and that it has no effect upon fatty material absorbed in molecularly dispersed form. This action may be due to the influence which the adrenal cortex has upon water and electrolyte metabolism. It is not impossible, therefore, that some relationship may exist between water and electrolyte absorption and the particulate absorption of long-chain triglyceride, and that the effect of the adrenal glands on the fat absorption mechanism is secondary to their action on electrolytes.

It has been claimed that triglycerides are resynthesised in the intestinal cell. There is no satisfactory evidence that this occurs, and the existence of this resynthesis is assumed on the basis of complete hydrolysis. If a considerable proportion of the fatty material is absorbed in the unhydrolysed form, resynthesis becomes a relatively unimportant issue.

If a reasonably normal quantity of fat is fed to a rat (say 250 mg. per 200 g. body

weight), very little fat will be found in the intestinal cell, or in the intestinal villi at the end of a three-hour experimental period. Practically all the fat will have been absorbed and disappeared. If two or three times this amount of fat is fed, however, accumulation of fat will be observed in the cells, in the form of large Sudan-staining droplets. This is the so-called classical picture of fat absorption. The factors affecting the passage of fat through the outer border of the cells would appear to be different from those which are concerned with its passage through the inner membrane. The amount of fat passing through the outer membrane can be increased in relation to increased intake, but the amount passing through the inner membrane appears to be restricted in some way, so that accumulation can occur. It may also be emphasised that many of the features, usually considered to be characteristic of normal absorption, may be due to the administration of an abnormally large quantity of material, or the restriction of other normal dietary constituents. So far as fat absorption is concerned, the whole problem must be re-examined, using physiological quantities of fats, and correlating the administration and absorption of fat with other normal constituents of the diet.

If a loading dose of fat is administered, the intestinal cells are filled with large globules of triglyceride, as already described, and the corium of the villus and the lacteals are empty of Sudan-staining material. If, however, exactly the same procedure is adopted, but 5 mg. of choline chloride is added to the water phase, the cells are largely cleared of fat, and the corium of the villus is filled with large pools of fatty material. The biochemical study of the choline effect shows no change in the amount of fat passing through the outer border, but a definite increase in the amount of fat which has left the intestine. The effect of Marmite on fat absorption was demonstrated by Mottram⁽⁴⁾ and his co-workers some 25 years ago. They attributed the change in the pattern of fat absorption to the presence of vitamin-B. If all the usual vitamin fractions are studied, none of them has any effect on the distribution of fatty material during absorption, with the exception of choline. Vitamin-B deficiencies, especially those associated with lack of riboflavin or nicotinic acid, are not uncommon in human cases of defective fat absorption. The signs of deficiency, however, can be removed by administration of large doses of riboflavin or nicotinic acid without any change in the quantity of fat absorbed. Classical cases of ariboflavinosis may have normal fat absorption. It may therefore be concluded that no direct relationship has so far been proved between vitamins and fat absorption, except for the effect of choline described above. The possible analogy between this effect of choline in the intestinal cells and the well-known lipotropic action of choline in the liver, is, of course, obvious, but so far there is no satisfactory evidence for any such hypothesis.

There is no doubt that phospholipid is formed in the intestinal cell, since labelled phosphorus, fatty acid and choline have been traced from the diet into the phospholipids leaving the intestine during fat absorption. It has not been possible, however, to ascribe any definite function to this phosphorylation phenomenon. It has been assumed that the formation of phospholipid must be an important factor in the absorption of triglyceride, and it has been suggested that phosphorylation is concerned in the resynthesis of the triglyceride molecule. Intermediate phosphorylation is not a necessary step in the resynthesis of triglyceride, which can

occur readily without it. In any case, resynthesis of triglyceride probably does not occur in the intestinal cell to any great extent, as already discussed. We may therefore conclude that phospholipid formation in the intestinal cell is either unrelated to triglyceride absorption, or else it is involved in some way not yet defined. Two possible suggestions may be tentatively presented.

If the fat particles present in the intestinal lumen are compared with those in the systemic blood at the height of fat absorption, striking differences may be observed. Those in the intestinal lumen have the same size and charge as the particles in the blood, but if they are mixed with plasma proteins at the pH of the blood they immediately flocculate into large clumps. D-lecithinase removes the choline and

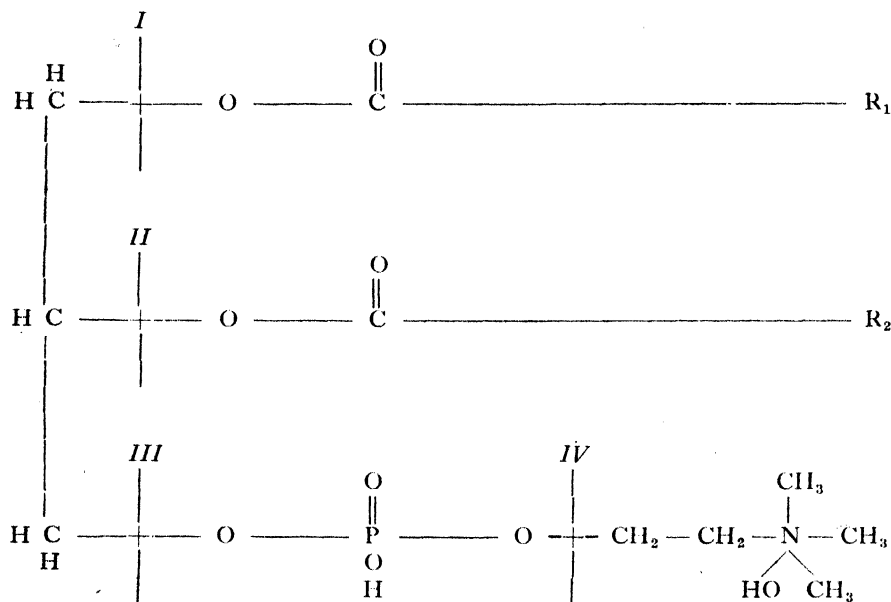


FIG. 6.—Diagram to show the probable formula for lecithin. The molecule can be broken down by the action of enzymes at the points indicated—I, II, III and IV
The D-lecithinase referred to in the text breaks the molecule at III

phosphorus from lecithin, leaving a diglyceride. (Figure 6.) If D-lecithinase is added to the fat particles from the intestinal lumen, it has no effect and the particles remain motile and dispersed. It is clear that the fat particles in the blood at the height of fat absorption do not flocculate in the presence of plasma proteins at normal pH. If they are treated with D-lecithinase, however, they immediately flocculate and cream. These reactions are exactly similar to those obtained with a simple, negatively charged, soap-stabilised emulsion on the one hand, and a lecithin-stabilised emulsion on the other. It seems reasonable to conclude, therefore, that phospholipid is not an essential part of the stabilising system in the intestinal lumen, but that it is essential to the stability of the fat particles in the blood. It is also clear that the dispersion of fat particles in the protein environment of the blood stream is maintained only if the interfacial structure of the particle is changed. Further investigation is required to

establish whether this change of interfacial film occurs in the intestinal cell, or whether the interfacial film undergoes a series of changes, dependent upon the changing environment in which the particles are placed. The second possible function of phosphorylation arises if the effect of choline in fat absorption is found to be analogous to the lipotropic action on the liver, which is now known to be due to phospholipid formation.

Absorbed fatty material might leave the intestine by either of two main routes—the portal circulatory system direct to the liver, or the lacteal lymphatic pathway by which it is conveyed to the systemic blood. There is no doubt that under normal circumstances, following the ingestion of long-chain triglycerides, a large amount of the fatty material normally passes by the thoracic duct chyle into the systemic circulation. It has been stated that this is the only effective distributive pathway for

	<i>Tributyrim</i>	<i>Long-Chain Triglyceride</i>	<i>Long-Chain Fatty Acid</i>
Water solubility	Freely soluble	Insoluble	Soluble in alkaline medium
Hydrolysis at pH 6.5 . .	Free	Restricted	—
<i>Emulsification</i>	Poor	Finely dispersed	Poor
<i>Intestinal cells</i>	Granular	Globular	Granular
<i>Lacteals</i>	Not milky	Milky	Not milky
<i>Chyle</i>	Not present	Present	Not present
<i>Systemic blood</i>	No lipæmia	Lipæmia	No lipæmia
<i>Fat depots</i>	No deposition	Deposition	No deposition
<i>Liver</i>	?	No deposition	Deposition
<i>Adrenalectomy</i>	No effect	Depressed	No effect

FIG. 7.—Illustrating differences between the absorption of tributyrin and long-chain triglycerides

fat. If, however, the thoracic duct is obstructed, or, in certain pathological cases in which no increase of fat occurs in the chyle after absorption, 70 per cent. of ingested fat may still be absorbed from the intestinal lumen. Thus, over 20 g. of fat may be absorbed without any fatty material passing into the systemic circulation via the thoracic duct. Such a state of affairs may go on for long periods, and one must conclude, therefore, that some alternative pathway to the thoracic duct exists for the removal of fatty material from the small intestine. It might be argued that this alternative pathway is used only under these abnormal circumstances. However, all the fat which has been absorbed has never been accounted for in the chyle. Tributyrin is not found in the chyle or in the fat depots after absorption. Triglyceride and its constituent fatty acids behave quite differently during and after absorption. These observations suggest that two pathways are normally used for fat absorption, and that one of the main factors determining the path taken by absorbed fatty material is its water-solubility or otherwise. Under normal circumstances this

depends upon hydrolysis, and, in the case of long-chain fatty acids, on the environmental pH.

The possible importance of pH is illustrated by the study of pathological cases affecting the upper or lower small intestine. In both cases a similar degree of defective fat absorption occurs, but if the upper part is affected, particulate absorption may cease, while if only the lower end is diseased, particulate absorption is usually normal. In conditions such as sprue, in which particulate absorption ceases, fatty acid absorption probably increases and there is some evidence of a change in pH towards the alkaline side. The differences between absorption of tributyrin and a long-chain triglyceride are summarised in Fig. 7. It can be seen that tributyrin behaves during absorption as though it were completely hydrolysed to fatty acid and glycerol, showing a striking contrast to long-chain triglyceride.

It is generally agreed that the triglyceride leaves the intestinal cell to pass into the body in particulate form. Other absorbed material is water-soluble and passes away from the intestine in the portal blood. When water, electrolytes, proteins, or carbohydrates, are absorbed, there is no marked increase in lymph flow. It may also be noted that in the classical observations on ionic absorption the behaviour of short-chain fatty acids was investigated. Rapid absorption was observed up to caprates, but the longer-chain fatty acids were very slowly absorbed, being comparable to sulphates. There is no clear reason to explain the differentiation in the absorption pathway for particulate fat as compared with that used for hydrolysed fat, or other water-soluble substances. It may, however, be significant that similar observations may be made elsewhere in the body. Thus, water-soluble dyes usually pass into the blood after injection, whereas particulate dyes go into the lymphatic vessels. Since we are concerned only with triglyceride, we shall follow the absorbed fatty material into the central lacteal.

The transference of the fatty material from the corium of the villus into the central lacteal, and thence into the intestinal lymphatics and thoracic duct, appears to be largely dependent upon the pumping action of the villi. This is illustrated by studying the effect of large doses of moniodoacetic acid on fat absorption in the rat. It was claimed by Professor Verzar that moniodoacetic acid interfered with the absorption of fat by preventing the formation of phospholipid. It has been subsequently demonstrated, however, that phospholipid formation in the intestinal cell is not affected by moniodoacetic acid intoxication. If the effect of moniodoacetic acid is studied in detail, it is found that most of the fat administered is retained in the stomach. Small amounts of less than 200 mg. pass into the small intestine and are absorbed through the intestinal cell. This fatty material is, however, seen to be lying in the corium of the villus. In normal animals, with or without choline, this amount of fatty material is cleared completely from the intestine in 3 hours. It is therefore suggested that the effect of moniodoacetic acid in these experiments is due to its depressant effect on gastric motility and on the pumping action of the villi, or similar activity of the muscularis mucosa.

Adequate attention has not been paid to the state of triglycerides in the chyle. We recently obtained some samples of chyle from a normal human subject. The fat is finely dispersed, and the particles remain discrete after centrifugation. This strongly suggests that protein is involved in the stabilising film of the particles. Analysis of

the fatty material shows that most of the fatty material is present as triglyceride. Some fatty acid is present, mainly combined with cholesterol. Some 6.3 per cent. of the fatty material is phospholipid and most of this phospholipid is of the lecithin type. These fat particles are, however, resistant to D-lecithinase, but they do not flocculate with plasma proteins at pH 7.4. It appears, therefore, that these fat particles, which were just about to enter the systemic blood, have different properties from the chylomicrons normally observed in the blood during fat absorption. This suggests that there may be certain intermediate steps in the change of the interfacial film structure of the particle between the intestinal lumen and the systemic blood. These problems are being further investigated.

The triglyceride present at any time in the blood may be determined by chemical analysis, but with the ordinary methods available rather large quantities of blood are required for each estimation. It is consequently difficult to carry out a serial investigation of blood fat levels on a quantitative basis. A useful assessment of the changes in blood triglyceride is obtained by counting the fat particles observed microscopically under dark ground illumination, using standardised conditions. These particle counts are made on a single drop of blood or serum. Consequently serial studies are easily made. By examining samples collected at frequent intervals after the administration of fat, or other substances, a blood fat curve or chylomicrograph is constructed. This method is valuable in absorption studies, but it has the disadvantage that it cannot be readily correlated with absolute values. Various other methods have been tried, such as the hæmolipocrit. Recently we have adapted and developed the excellent micro-estimation technique described by Dr. Schmidt-Nielsen,⁽⁵⁾ of Copenhagen. Accurate estimations can be made, using the same quantity of material that is required for particle counts. This quantitative technique will probably replace chylomicrographs in our future investigations.

The triglycerides, which now circulate in the form of particles 0.5 to 1.0 μ diameter, are largely removed into the fat depots. This removal from the circulation is fairly complete if the amount of fat ingested is not excessive. Excessive quantities of fat, however, seem to flood the fat depots, and result in an accumulation of triglyceride in the liver. The mechanism by which triglycerides pass from the circulating blood into the cells of the fat depots is quite obscure. One would imagine that these fat particles must come to a stop in the capillaries, producing a temporary physiological fat embolism. There is some evidence that some such hold-up of the fat in capillaries does occur after a fatty meal, but much more extensive investigation of this problem is needed before any clear understanding of the mechanism of fat deposition is reached.

Detailed information with regard to the composition of the majority of natural animal and vegetable fats is now available, largely due to the work of Professor Hilditch⁽⁶⁾ and his colleagues in Liverpool. The fat in the depots consists mainly of long-chain triglycerides, containing a high proportion of saturated fatty acids. There is no doubt that the nature of the triglycerides in the fat depots can be altered by dietary means. The depot fat is derived directly from fat in the food, or indirectly by formation of fat from carbohydrates. The higher the proportion of fat in the diet, the more closely will the depot fat resemble the dietary fat. On a low fat diet a higher proportion of the fat deposited in the depots comes from carbohydrate.

This synthetic fat dilutes the dietary fat, so that similarity between dietary and depot fat tends to disappear. Triglyceride does not remain in the fat depots very long. Using isotope-labelled material, Schönheimer and Rittenberg(?) showed that the fat depots are rapidly turned over, having a half life of six to eight days.

The mechanism of mobilisation of fat from the fat depots is just as obscure as the mechanism of deposition. It is clear that there must be a continual mobilisation from the fat depots. It appears that this mobilisation may be affected by nervous

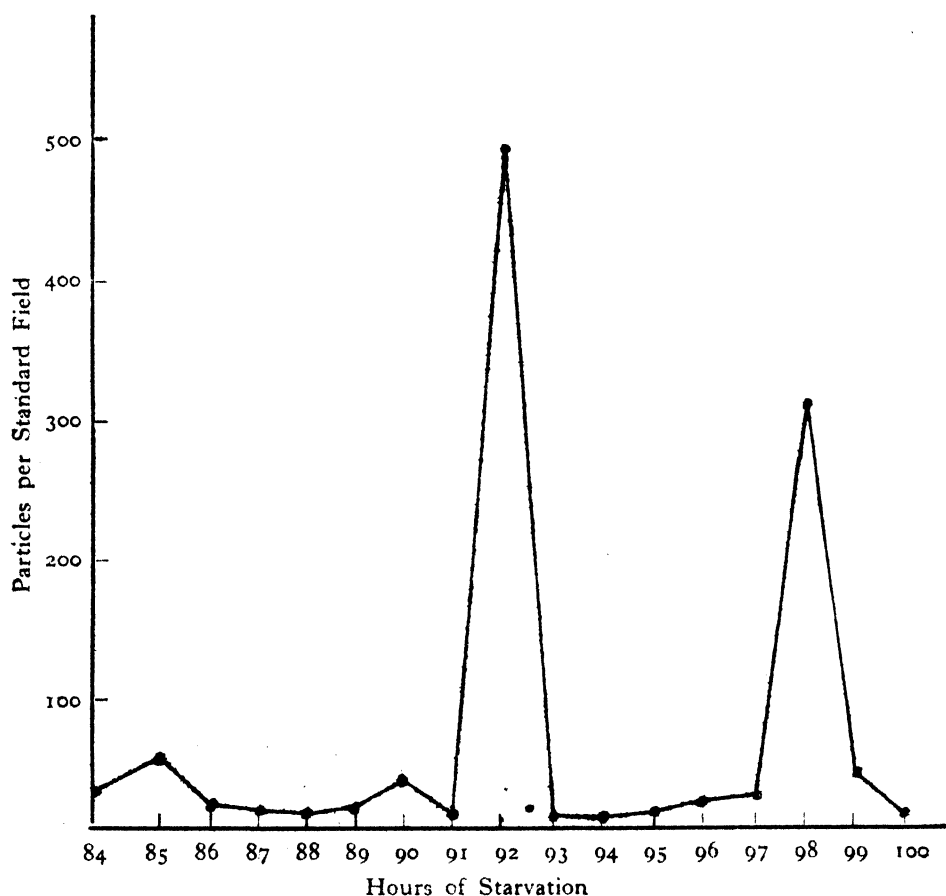


FIG. 8.—*Lipomicrograph during starvation, showing typical fat crises at 92 and 98 hr.*

factors, by hormones, and possibly by the varying metabolic demands. Some years ago we made an observation on fat mobilisation which may be of interest. A group of us were carrying out experiments on starvation, over a period of seven to ten days. During the whole of this period we examined the blood fat level at hourly intervals, by the use of the chylomicrograph technique. After about 12 hours starvation, a basic level of fat particles is established, usually less than 10 particles in a standard field. This remains constant for the first 36 hours. At about this time a marked increase in the particles is seen at about 5-hourly intervals. This increase

of blood fat appears suddenly and disappears again, so that out of three consecutive hourly samples two may be basic, with less than 10 particles per field, while the middle sample contains as many as 500 particles per field (Fig. 8). We have called these sudden transient lipæmic outbursts "fat crises". It is possible that these observations may explain many of the anomalous reports in the literature of blood fat levels during starvation. The explanation of the fat crisis is not clear. It is tentatively suggested that fat may be mobilised from the fat depots via lymphatic channels. The sudden increase in blood fat may be due to the periodic emptying of fat-laden lymph into the blood stream from the thoracic duct.

The other possible destination for triglyceride is the liver. This normally receives triglyceride mobilised from the fat depots. Recently absorbed triglyceride may also reach the liver if the quantities ingested are excessive. It is not at all clear how the liver deals with these long-chain triglycerides. The lipases, which can be isolated from the liver, are more effective against short-chain esters than against these long-chain fats. The presence of choline in the diet appears to influence the accumulation of triglyceride in the liver. This lipotropic effect of choline, or choline-forming substances like methionine, has been extensively investigated by workers in Toronto under Professor Best,⁽⁸⁾ and by Professor Channon⁽⁹⁾ in Liverpool. It seems probable that one of two things must happen to the triglyceride which reaches the liver. It is either converted into structural lipoprotein units, which are continually required for growth or repair, or it undergoes oxidation with the production of energy. A great deal of work has been done on fat oxidation, and many of the problems in this field have been clarified by the recent work of Drs. McKay and Barnes⁽¹⁰⁾ in the United States. The essential steps, from the arrival of the triglyceride at the liver to the point where the problem can be linked to the fatty acid oxidation mechanism, are quite unknown. Some years ago Professor Raper,⁽¹¹⁾ of Manchester, suggested that preliminary desaturation of fats occurred in the liver as a preliminary to biological oxidation. There is no doubt that the fats in the liver are more unsaturated than those in the fat depots. It is possible, however, that desaturation may be more important in relation to lipoprotein formation than as a preliminary to oxidation.

In conclusion, it will be seen that long-chain triglycerides differ in many respects from all other foodstuffs. Unlike most other substances absorbed into the body, they are quite insoluble in water. Unlike carbohydrates and proteins, they may pass into the body practically unchanged, so that the characteristic properties of the dietary triglycerides may be reflected in the qualities of the depot fats. The pathway which they take after absorption is different from that used by other absorbed material. A special system is necessary for the transport of triglycerides in the blood, and the emulsion which is formed has certain characteristic properties. The triglyceride may be stored as a reserve of energy, which may be brought into use over a relatively long period of time. Finally, the triglyceride which eventually reaches the liver may be used for essential building units, or may undergo biological degradation into combustible material. While it may be true that triglyceride can be largely replaced in the diet by carbohydrates without deleterious effects on health, it is also clear that triglyceride has many exceptional virtues as a dietary component. It is palatable, it is concentrated, having a high energy value per unit weight, it is flexible in use, since it can be made available for immediate or for remote metabolism,

or for building and repair as well as for energy. Dietary triglyceride therefore makes a valuable contribution to the body economy.

The original work described above has been carried out in collaboration with a number of colleagues in Birmingham, London and Cambridge. We are greatly indebted to the Sir Halley Stewart Trust and the Medical Research Council for considerable financial help in connection with this work.

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Further details of original material presented will be found in the following papers, in which full references are given :

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OBITUARY

SIR CLIFFORD PATERSON, O.B.E., D.Sc., F.R.S.—We regret to announce the death of Sir Clifford Paterson, who had been a Fellow of the Society since 1926 and was a member of Council from 1932–1947. It was to his influence that some of the most important pre-war papers on electrical subjects read to the Society were due, and he himself read a paper to the Society in 1927 on the manufacture of electric lamps and thermionic valves for which he received the Society's silver medal. He also took an active part in many of the Society's meetings and was in the Chair on a number of occasions.

In his younger days, Sir Clifford spent seventeen years on the staff of the National Physical Laboratory before being offered in 1916 by the late Lord Hirst the important task of founding the research laboratories of the General Electric Company. He had to wait until the end of the war to carry this out. He regarded such an enterprise—the bringing together of Science and Industry—as his life's work and to him in no small measure is due the modern conception of research in industry.

In 1946 Sir Clifford was awarded the James Alfred Ewing Medal by the Institution of Civil Engineers. His prowess was also recognised by the City and during the first two years of the recent war he was elected Master of the Worshipful Company of Tallow Chandlers.

GENERAL NOTES

THE HOLKHAM HALL COLLECTION.—The exhibition of forty-five old master drawings from the Earl of Leicester's collection at Holkham Hall, which has lately closed at No. 4, St. James's Square, will move under the auspices of the Arts Council to Cheltenham until the end of August, and later to Wakefield and other centres. This selection from one of the few fine private collections left in the country should on no account be missed by Fellows who have an opportunity of visiting the exhibition while

it is on tour. Although the Holkham drawings, acquired for the first Earl in the eighteenth century, cannot be compared either in scope or richness with the Chatsworth collection formed at the same period, they include nevertheless several eminent treasures, notably Raphael's cartoon for "La Belle Jardinière" in the Louvre—one of the few Renaissance works here.

This wonderfully gracious charcoal drawing, which shows the Virgin and Child with St. John in a characteristic pyramidal design, is unfortunately much discoloured by old varnish; albeit the exquisite modelling of the limbs, let us hope, is preserved for all time.

The greatest revelation of the exhibition, however, is the remarkable series of drawings by Claude Lorrain, several of which appear to be direct studies from nature. It is interesting to compare the two classical landscapes (Nos. 31 and 32) with the extraordinarily unconventional "Seaport with a Stormy Sky"—possibly the port of Genoa—and the brush drawing of "A Waterfall", wholly uncharacteristic of Claude and rather Chinese in feeling.

Elsewhere, one would draw attention to two singularly beautiful landscapes by Pietro da Cortona, a finely posed figure by Veronese, delicately heightened with white, and—to come nearer home—an attractive "Head of a Boy" which Mr. A. E. Popham is inclined to ascribe to Lely rather than to Van Dyck, the traditional attribution.

N. A. D. W.

NOTES ON BOOKS

FIN DE SIÈCLE—With a note on the Period by Holbrook Jackson. Edited by Nevile Wallis. Allan Wingate. 1948. 10s. 6d.

Readers of the *Journal* will be interested in this slim anthology of late nineteenth-century literature and art which has been compiled by Mr. Nevile Wallis, one of the *Journal's* most regular contributors, and the Art Critic of *Punch*.

The book contains excerpts from the works of nearly all the great figures of the Period, and what a period it was! In its pages Beerbohm and Oscar Wilde, Kenneth Graham and Swinburne, Robert Bridges, Aubrey Beardsley and Whistler, jostle each other and many more—each great in his own right and each the greater for being seen against the background of the age. The only disappointment is that there are no women present to balance the picture—but the late Victorian era was pre-eminently a man's age and so this is perhaps correct.

The book is further enhanced by Mr. Wallis's Introduction and by his commentaries on the different subjects. It is a book of gracious things and makes one not a little nostalgic for a period, still within the memories of many, when the use of beautiful language was still an art.

FIFTY MODERN CHURCHES. Compiled by the Incorporated Church Building Society. 1948. 7s. 6d.

It is a sad reflection that the construction of buildings, other than "housing", is so under restriction that the building of new churches is impossible at the present time. When we have surmounted our economic difficulties, a great amount of church building will be overdue. New towns and the re-distribution of population will be a challenge to provide new churches for modern needs.

The Incorporated Church Building Society is alive to this and to the many problems of planning and design in church building that confront us. As a guide and help nothing could be more appropriate than the book "Fifty Modern Churches", published by them, where may be seen admirable photographs and plans illustrating some of the new churches built since 1930. The book is increased in usefulness as a work of reference by the inclusion of a complete list of Consecrated Anglican churches built in

England since that date. Photographs are useful in showing the varied ways in which committees and architects have solved their problems, but it is only by a visit that one can completely grasp the success or otherwise which has been achieved in creating a devotional atmosphere.

In an age where tradition in our national life, as well as in the forms of art and architecture, is everywhere subjected to questioning, the work of the architect in finding an expression of form suited to the modern outlook is not a simple matter.

The solutions, as this book will show, are very varied, and as one may expect, are not always happy. Broadly speaking, a conscious straining after new shapes and new effects is a too common fault, although some of the illustrations show how effective straightforward building and simple massing of parts can be.

The fundamental requirement in a church is a religious atmosphere. The tendency of modern thought, directed to material values and practical efficiency, is not conducive to the moral and spiritual values that must find expression in the design of a church that is to fulfil its true function. The architect who has within himself something of the religious spirit and who has an architectural sense, has no need to strain after some new form or language. He will say something fresh while basing his design on recognisable forms of ecclesiastical architecture.

The most successful examples in this book are undoubtedly those buildings that do not seek after modernism, but which by simplicity achieve a spirit of calmness and serenity.

OSWALD P. MILNE.



Ocean Games Cabinets for Seamen

★
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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4776

FRIDAY, AUGUST 27, 1948

VOL. xcvi

THE LIBRARY

The following letter from the Chairman of Council addressed to the Editor of *The Times* was published in *The Times* of July 30th, 1948. It is hoped that Fellows who know of the existence of any books on exhibitions as described in the letter, will inform the Librarian.

THE FESTIVAL OF 1951

Sir—As 1951 approaches and plans are being made for the Festival of Britain to be held that year, it would seem essential that there should be a source to which the public may turn for information on exhibitions of the past and for guidance in organising exhibitions in the future. Such information is not at present easily accessible. The Royal Society of Arts, which was founded in 1754, has always played a prominent part in encouraging exhibitions, both large and small. It therefore seems fitting that in this historic building, where plans for the Great Exhibition of 1851 were first born and in the very room where some of the earliest exhibitions of which there is any record were held in the latter half of the eighteenth century, there should now be housed a collection of books on exhibitions.

If any of your readers are interested in this suggestion and can help by collecting and presenting such material to the library of the Royal Society of Arts, another small advance may be achieved towards 1951, by way of preparation and public appreciation of the major effort.

Yours, etc.,

H. A. F. LINDSAY,

Chairman of Council, Royal Society of Arts.

R.D.I. EXHIBITION

As previously announced in the *Journal*, an exhibition of the work of members of the Faculty of Royal Designers for Industry is to be presented at the Royal Academy, Burlington House, in the Autumn. Arrangements for this exhibition are now well in hand and it is hoped to include several articles on the Faculty of Royal Designers for Industry in subsequent numbers of the *Journal*.

The exhibition is to be entitled "Design at Work", and is being sponsored jointly by the Royal Society of Arts and the Council of Industrial Design. Its principal aim is to explain to manufacturers and to the general public the nature of industrial design and the place in society of the designer. It is hoped that the exhibition will play a useful part in stimulating manufacturers and others in anticipation of the Festival of Britain, 1951, in which the Society has great interest. The exhibition will be opened on October 26th by Her Royal Highness The Duchess of Kent and will remain open until November 28th.

The exhibition will consist of the display in documentary form of a series of individual case histories, each demonstrating the process of design. Each of these will show the development of an object from its inception to its eventual quantity production. These case histories will range very wide. They will include, among many others, such varied objects as a jet aeroplane and a television set. It is hoped that the exhibition will also show the part which manufacturers, retailers and consumers can each play in improving standards of industrial design, and that it will prove a worthy successor to the 1935 Royal Academy Exhibition of British Art in Industry which was sponsored jointly by the Society and by the Royal Academy.

The following article which appeared in the March, 1948, issue of *Art and Industry* and is reprinted by kind permission illustrates the close link between these two exhibitions:

1935—THE ROYAL ACADEMY EXHIBITION OF BRITISH ART IN INDUSTRY

Recently under this series of title we discussed Geoffrey Holme's book 'Industrial Design and the Future'. Less than a full year later came another important landmark in industrial design, the Exhibition of British Art in Industry at Burlington House, sponsored by the Royal Society of Arts and the Royal Academy, which has never received its due meed of praise.

The object of the Exhibition was of national importance and its plan revolutionary. Then, the movement towards good design in industry was in its infancy and the sponsors, foreseeing its importance in connection with the maintenance of trade, boldly conceived an Exhibition which should prove to industry and the world that British design was a factor in the creation of trade and the best British designers men of a calibre fully equal to their foreign confreres, who at that time largely held sway over our manufacturers.

Many exhibitions had failed to show a representative selection of the best designed goods, for two reasons; the first, that the exhibitor having paid for his stand or space very naturally expected to show goods selected by himself as most likely to produce him profit; the second, that the sponsors of such exhibitions, for that reason, had no real control over the quality of the goods exhibited.

The 1935 Exhibition boldly faced these difficulties, and for the first time decided that no charge should be made to exhibitors for the display of their products, and that the exhibits should be chosen by a selection panel of experts appointed by the sponsors. Thus for the first time—twelve years before the *Britain can make it*—they arranged a selective Exhibition in which the quality of the exhibits was controlled.

How great was their courage and their faith, and how much is owed to their vision and initiative. The sale of space is an important source of exhibition revenue, and in those days no Government department was predisposed to spend public money on an exhibition of this kind. The sponsors, therefore, by their action reduced their revenue substantially and stood to make a loss on the enterprise. This risk was voluntarily guaranteed by Fellows of the Royal Society of Arts, who backed their faith with hard cash out of their own pockets. But for this, the Exhibition could not have taken place, and it may be that the Council of Industrial Design would never have been born or that *Britain can*

make it, which followed a similar plan on a larger scale, but with the great advantage of Government subsidy, might never have been thought of.

The 1935 Exhibition for the first time gave recognition to the designer by coupling his name with that of the manufacturer in the description of exhibits in catalogue and on stands. It was independent, disinterested, and national in character. Planned to stress the importance of design, it gave a great stimulus to industry and so awakened the Government to the need for action that it brought into being the Council of Art and Industry, from which the Council of Industrial Design was later to spring. Through the Exhibition also came the foundation by the Royal Society of Arts of the Faculty of Royal Designers for Industry—the R.A.'s of Industrial Design—which is now one of the most selective and coveted of distinctions.

A revolution in established exhibition practice, it was inevitable that this Exhibition should attract considerable criticism, much of it doubtless due to unfamiliarity with method and principle on the part of those whose cherished products were not selected for inclusion. Despite such criticism the Exhibition was an outstanding success and brought recognition to the quality of British designers from all over the world. It was a great step forward and paved the way over which its successors could tread.

In any review of the 1935 Exhibition credit must be given to Mr. John A. Milne, then Chairman of the Royal Society of Arts, and to that Society for initiative, vision and leadership. They lighted a torch which has never been extinguished and is now burning brightly—a beacon of hope for the revival of Britain.

SIR WILLIAM JACKSON POPE MEMORIAL LECTURE

RECENT ADVANCES IN STEREOCHEMISTRY

By F. G. MANN, SC.D., D.SC., F.R.S.

Ordinary Meeting, Wednesday, May 5th, 1948

C. S. GIBSON, Esq., O.B.E., M.A., SC.D., F.R.S., *Professor of Chemistry in the University of London at Guy's Hospital, in the Chair*

THE CHAIRMAN: Ladies and Gentlemen, it is for me a very great honour and a very high privilege to introduce to you Dr. Mann, who is giving the third Sir William Jackson Pope Memorial Lecture. Dr. Mann, like myself, was a collaborator with Sir William Jackson Pope during many years, and he is therefore familiar with all that Pope did, and he knows the origin of many of the discoveries which Pope made. As many of you may know, Pope based his work in stereochemistry on an intimate knowledge of the principles of symmetry, which he obtained through the study of classical crystallography, and it is on that broad basis on which Pope's work was built. Dr. Mann will, I think, be able to-day to indicate some of the most remarkable developments from the early work of Pope, and we are very pleased that he should put them forward in the third Sir William Jackson Pope Memorial Lecture. I will now call upon Dr. Mann for his lecture.

The following paper was then read:

We meet this afternoon to honour the memory of Professor Sir William Jackson Pope. This is the third occasion on which a Memorial Lecture to his life and work has been given. On the first occasion, in 1946, Professor C. S. Gibson discussed "The

Life and Work of Sir William Jackson Pope", and on the second occasion, in 1947, Dr. L. H. Lampitt discussed "Sir William Jackson Pope: His Influence on Scientific Organisation". On the present occasion I am discussing "Recent Advances in Stereochemistry", a subject chosen because the study of stereochemistry occupied the major part of Pope's scientific work. The substance of this lecture, if combined with that of the earlier lectures by Professor Gibson and Dr. Lampitt, should serve to give a representative picture not only of Pope's life and work, but also of the results which accrued from his work and influence.

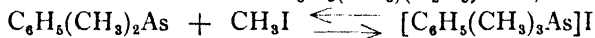
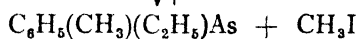
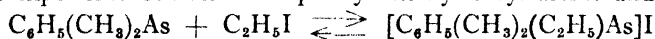
In dealing with "Recent Advances in Stereochemistry", I am however labouring under one great disadvantage. It is a branch of chemical study which covers both organic and inorganic chemistry and is, therefore, of considerable volume: it is also a branch of chemical study which has developed widely in many diverse directions during the last two or three decades. It is impossible therefore in one lecture to discuss adequately the many advances which stereochemistry has made during recent years: if I were to attempt to do so, this lecture would become merely a wearisome catalogue of compounds successfully investigated. I propose therefore to select certain lines of development which have arisen primarily from Pope's own work and influence, and which can therefore be regarded as being in almost direct descent from his own scientific work. This treatment will necessarily entail jettisoning whole chapters of stereochemical work, but it will be realised that their omission is due solely to lack of time.

There is little doubt that the most outstanding stereochemical investigation that Pope carried out—the most outstanding when viewed in its historical perspective—was his resolution with Peachey in 1899 of a quaternary ammonium salt, namely phenyl-benzyl-allyl-methyl-ammonium iodide, $[\text{C}_6\text{H}_5(\text{C}_6\text{H}_5\text{CH}_2)(\text{C}_3\text{H}_7)(\text{CH}_3)\text{N}]\text{I}$. This was the first compound to be resolved into optically active forms in which the activity was due to an asymmetric atom other than carbon. It showed decisively that the four groups attached to the nitrogen atom could not be in the same plane as this atom, although the actual configuration of the ammonium ion was not determined by stereochemical means until Mills and Warren's work in 1925. It was natural after this result that chemists should turn their attention to similar quaternary phosphonium and arsonium salts, since it was exceedingly unlikely that the phosphonium and arsonium salts should have a configuration different from that of the ammonium salts. In many laboratories and in several countries chemists set themselves the task of preparing quaternary salts of type $[\text{abcdP}]\text{X}$ and $[\text{abcdAs}]\text{X}$, in which a , b , c and d represent unlike groups and X an acid radical, and then resolving these salts into optically active forms as Pope and Peachey had resolved their ammonium salts. The major portion of this work was devoted to the arsonium salts, as these are easier to prepare, and crystallise far more readily, than the corresponding phosphonium salts. It is a striking fact, however, that until recently all attempts to resolve these phosphonium and arsonium salts into optically stable forms had failed. In the phosphonium field the failure had been complete; in the arsonium field however Dr. Burrows and Professor Turner, the latter a former pupil of Pope, had in 1921 isolated phenyl- α -naphthyl-benzyl-methyl-arsonium iodide, $[\text{C}_6\text{H}_5(\text{C}_{10}\text{H}_7)(\text{C}_6\text{H}_5\text{CH}_2)(\text{CH}_3)\text{As}]\text{I}$, having $[\text{M}]_D + 12^\circ$, but this rotation disappeared rapidly in solution. Similarly Kamai in 1933 had isolated *p*-tolyl-benzyl-

ethyl-*n*-propyl-arsonium iodide, $[C_7H_7(C_6H_5CH_2)(C_2H_5)(C_3H_7)As]I$, having $[M]_D + 45^\circ$, but again this small rotation disappeared very rapidly in organic solvents. This failure to extend Pope's work on nitrogen into the phosphorus and arsenic fields was striking. I have no doubt that this failure was due fundamentally to the occurrence in solution of a "dissociation-equilibrium" which caused very rapid racemisation. This possibility had been suggested by Pope and Harvey in 1901 with regard to certain of their ammonium salts, but it was Burrows and Turner who extended the theory to arsonium salts and provided considerable evidence for its occurrence. They pointed out that many quaternary arsonium salts, particularly halides, dissociate readily in organic solvents to give an equilibrium of type:

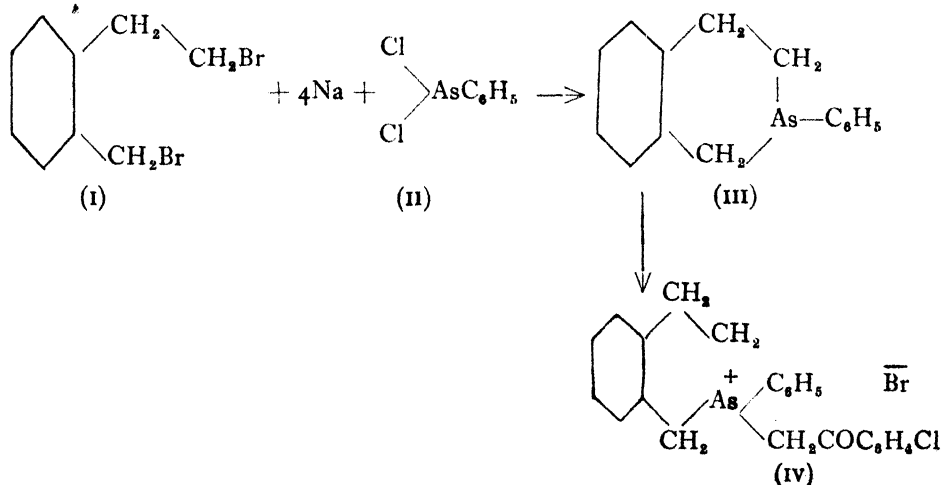


If an optically active arsonium iodide were to undergo this type of dissociation, racemisation would be rapid. Burrows and Turner utilised an ingenious method to demonstrate the existence of this equilibrium. They showed for instance that phenyl-dimethyl-arsine, when treated at room temperature with ethyl iodide, gave not only the expected phenyl-dimethyl-ethyl-arsonium iodide, but also a considerable yield of phenyl-trimethyl-arsonium iodide. This might appear an extraordinary result, but it will be seen that if the former salt dissociated, not only into its original components but also into phenyl-methyl-ethyl-arsine and methyl



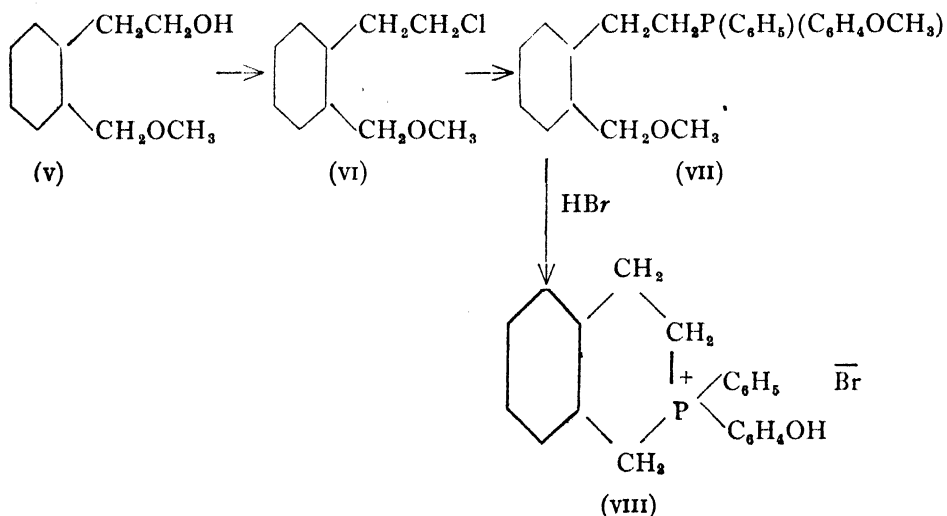
iodide, the latter compound could then combine with the initial phenyl-dimethyl-arsine to give the phenyl-trimethyl-arsonium iodide. The existence of the dissociation-equilibria affords the only plausible explanation of these experimental facts. Now all the phosphonium and arsonium salts the resolution of which had been attempted had contained at least one alkyl group, and dissociation in solution could always occur.

In 1943 Dr. Holliman and I were able to synthesise a much more stable example



of an arsonium salt. By condensing *o*-2-bromoethyl-benzyl bromide (I) with phenyldichloro-arsine (II) in the presence of sodium, we were able to prepare a novel type of tertiary arsine, namely, 2-phenyl-1:2:3:4-tetrahydro-*iso*-arsinoline (III). This compound reacted readily with *p*-chlorophenacyl bromide to give 2-phenyl-2-*p*-chlorophenacyl-1:2:3:4-tetrahydro-*iso*-arsinolinium bromide (IV). Here we had a quaternary arsonium salt which was devoid of any element of symmetry: it possessed a very stable ring system and moreover there was indirect evidence that the *p*-chlorophenacyl group was also firmly attached to the arsenic atom. The salt therefore should not dissociate, even to a minute extent, in solution. In harmony with these facts, we were able to resolve the salt readily *via* the bromocamphor sulphonates and obtain the *d*- and *l*-arsonium picrates having $[M]_D + 457^\circ$ and -450° : the *l*-arsonium iodide had $[M]_D - 354^\circ$ and underwent no racemisation in solution at room temperature over a period of five days.

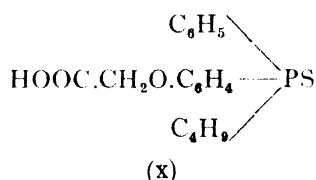
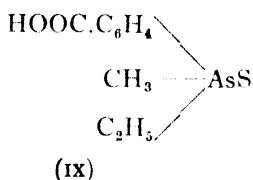
Dr. Holliman and I have spent a considerable time attempting to prepare and



resolve a similar phosphonium salt. The synthesis of organic derivatives of phosphorus is almost always more difficult than that of comparable arsenic compounds, and initially we experienced very considerable difficulties. Our final synthesis (1947) may be briefly outlined to illustrate the indirect route that ultimately had to be employed. *o*-2-Hydroxyethyl-benzyl methyl ether (v), an intermediate used in the synthesis of the dibromide (1), was converted to the corresponding 2-chloroethyl derivative (vi): this compound in turn was treated with magnesium to give a Grignard reagent, which reacted readily with phenyl-*p*-anisyl-monochlorophosphine, $C_6H_5(CH_3O.C_6H_4)PCl$, to give phenyl-*p*-anisyl-2-(*o*-methoxy-methyl-phenyl)-ethylphosphine (vii). When this compound was boiled with hydrogen bromide in acetic acid solution, the methoxy-methyl-group was converted to a bromomethyl group and cyclisation to the phosphonium salt followed: simultaneously the *p*-anisyl group was also demethylated to a *p*-hydroxy-phenyl group. Hence one operation furnished 2-phenyl-2-*p*-hydroxyphenyl-1:2:3:4-tetrahydro-*iso*-phosphinolinium bromide (viii). This compound, like the arsenic analogue, had considerable stability,

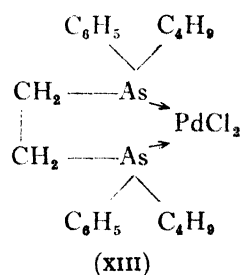
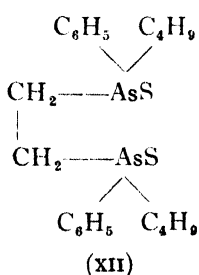
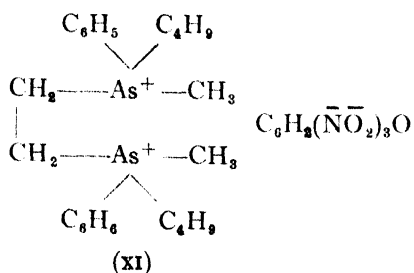
and we were able to resolve it and so obtain the *d*-bromide, having $[\dot{M}]_D + 32.9^\circ$, which also showed no racemisation in solution. This remains the only quaternary phosphonium salt to be obtained in optically active forms. I think it can be fairly said that these two resolutions have bridged a gap which for a period of about 45 years had existed between the anticipations of theory on the one hand and their experimental realisation on the other.

One further point in connection with the stereochemistry of phosphorus should be mentioned. It may be recalled that Meisenheimer in Germany in the course of a long investigation between the years 1911–1926 had shown that a tertiary phosphine oxide, of type *abc*PO, could be resolved into optically active forms, which possessed very considerable optical stability. No similar tertiary arsine oxide, *abc*AsO, has yet been obtained in optically active forms, and the reasons for this failure remain obscure. In 1925, however, Mills and Raper prepared a similar tertiary arsine sulphide, *p*-carboxyphenyl-methyl-ethyl-arsine sulphide (ix), and showed that it could be separated into optical isomers of great optical stability. Just before the



outbreak of the recent war, Dr. Cule Davies and I were engaged in the preparation and resolution of an analogous phosphine sulphide. The preparation and isolation of a suitable compound again illustrated vividly the much greater difficulty of synthetic processes in the phosphorus field compared with that in the arsenic field. Ultimately however (1944), we succeeded in preparing phenyl-*p*-(carboxy-methoxy-phenyl)-*n*-butyl-phosphine sulphide (x), and resolving it into optical antimers, having $[\dot{M}]_D + 9.6^\circ$ and -9.7° respectively.

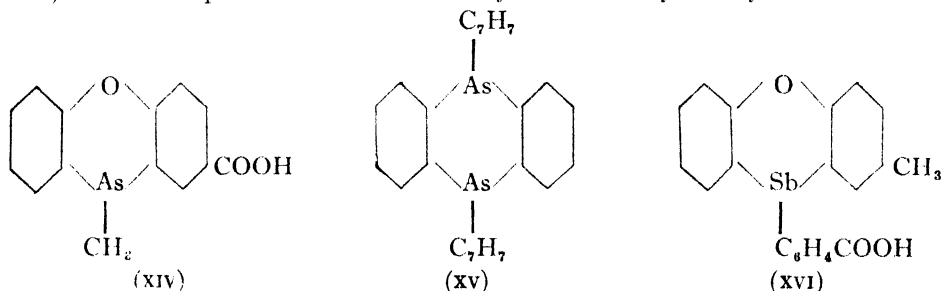
A further aspect of this work on 4-covalent arsenic and phosphorus compounds is illustrated by the trio of compounds, ethylene- $\alpha\beta$ -bis-(phenyl-methyl-*n*-butyl-arsonium picrate) (xi), ethylene- $\alpha\beta$ -bis-(phenyl-*n*-butyl-arsine sulphide) (xii), and ethylene- $\alpha\beta$ -bis-(phenyl-*n*-butyl-arsine)-dichloro-palladium (xiii), which Chatt and I synthesised in 1939. It will be seen that each of these compounds



contains two asymmetric 4-covalent arsenic atoms, but that the set of four unlike groups attached to each of the two arsenic atoms is identical. Consequently each of these three compounds can exist in a racemic and a *meso* form, their stereochemistry in this respect being similar to that of tartaric acid. By a delicate

process of fractional crystallisation, we succeeded in separating each of these compounds into two distinct isomers: in each case one isomer must have been the racemic form and one the *meso* form, although we had no evidence regarding the specific identity of each isomer.

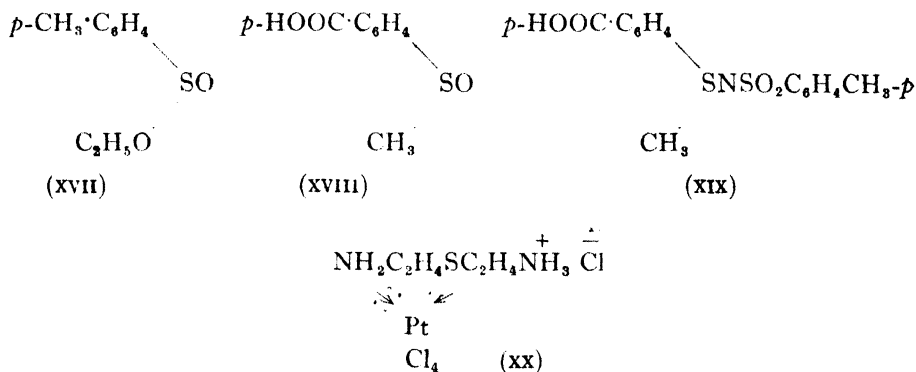
All the above work can be considered as being in direct line with Pope's original work on quaternary ammonium salts. Other types of isomerism have recently come to light which depend primarily on the valency angle of the 3-covalent arsenic atom, a type of isomerism which Pope never studied. The first of these compounds was 10-methyl-phenoxarsine-2-carboxylic acid (xiv), and its 10-ethyl and 10-phenyl homologues, which Lesslie and Turner (1934-1936) have prepared and resolved into optically active forms. In these compounds, the intervalency angle at the arsenic atom almost certainly causes the molecule to be folded about the $O \cdots \cdots As$ axis, and thus deprives the molecule of any element of symmetry. In the case of



5: 10-di-*p*-tolyl-5: 10-dihydroarsanthren (xv), the intervalency angle at the arsenic atoms certainly causes the molecule to be folded about the $As \cdots \cdots As$ axis, and consequently to exist in two geometrically isomeric forms. It was on the basis of this reasoning that Chatt and I (1940) prepared this compound and by fractional crystallisation separated it into the two isomeric forms demanded by theory. More recently (1947), Dr. Campbell has prepared 10-*p*-carboxyphenyl-2-methyl-phenoxstibine (xvi): this compound is similarly folded about the $O \cdots \cdots Sb$ axis and is consequently devoid of symmetry. Dr. Campbell was therefore able to resolve the compound into its two forms, having $[M]_D + 326^\circ$ in chloroform solution. This is the first compound to show optical activity due to the disposition of the valencies of an antimony atom. Synthetic work in the field of heterocyclic antimony compounds is exceptionally difficult, and is beset with many obstacles and disappointments, and the successful synthesis and resolution of the above compound form a most notable achievement upon which all stereochemists will warmly congratulate Miss Campbell.

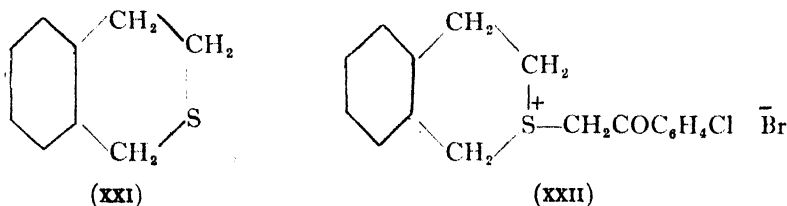
Pope's classical work on the resolution of a quaternary ammonium salt was rapidly followed by parallel work in another field, namely, his resolution (with Peachey) of a sulphonium salt, methyl-ethyl-carboxymethyl-sulphonium bromide, $[CH_3(C_2H_5)(CH_2COOH)S]Br$, in 1900, and his resolution (with Neville) of a similar selenonium salt, methyl-phenyl-carboxymethyl-selenonium bromide, $[CH_3(C_6H_5)(CH_2COOH)Se]Br$, in 1902. To the modern chemist it must appear strange that the deeper implications of these results were not apparent to Pope and his colleagues. Pope realised clearly—by his method of resolution via the brom-camphor-sulphonates—that in the above compounds the linkage of the bromine to

the sulphur and selenium atoms must differ from that of the organic groups to these atoms. Yet the corollary, namely, that the spatial arrangement of the three organic groups around the sulphur and selenium atom in the above ions, *i.e.*, the arrangement which was the prime factor underlying the resolution, would also occur in other suitable classes of sulphur compound, apparently evaded chemists for nearly a quarter of a century after Pope's pioneering work. The probable reason for this oversight was the fact that in all these other classes, the sulphur atom was always formally represented as joined by a double bond to another atom, and hence by the van't Hoff-Le Bel hypothesis it could not be asymmetric. It was not until 1925 that Phillips, Kenyon and their co-workers at Battersea Polytechnic showed first that sulphinic esters such as (xvii), then sulphoxides (xviii), and finally the sulphilimines of Mann and Pope (xix), could be isolated in optically active forms. In 1930 Mann added a fourth class of "3-covalent" sulphur compound, by preparing



and resolving the co-ordinated platinum compound (xx). The very elegant examples of geometric isomerism in suitable derivatives of cyclic sulphur compounds by Bennet also rapidly followed Phillips' initial work on the sulphinic esters.

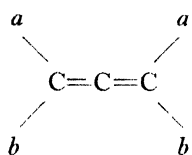
Dr. Holliman and I have recently (1946) been able to extend considerably Pope's sulphur and selenium work by the use of the dibromide (i) which I have previously mentioned. When this di-bromide was boiled with sodium sulphide in alcoholic solution, it yielded thio-*iso*-chroman (xxi), and we were able to prepare seleno-*iso*-chroman and telluro-*iso*-chroman by similar methods. The thio-*iso*-chroman readily combined with *p*-chlorophenacyl bromide to yield



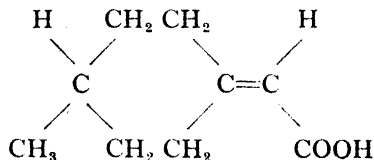
p-chlorophenacyl-thio-*iso*-chromanium bromide (xxii): the selenium and tellurium analogues of (xxii) were also readily obtained, and all three compounds were isolated as beautiful colourless crystals. Now the sulphonium salt (xxii) is precisely

similar in stereochemical type to Pope and Peachey's original sulphonium salt, and of course possesses no element of symmetry. Holliman and I therefore converted the bromide (xxii) to the *d*-bromcamphor sulphonate, and found that recrystallisation readily gave complete resolution: the optically active sulphonium ion was then precipitated as the picrate. We were then able to repeat this process with the selenium and tellurium analogues of the compound (xxii). Certain points of considerable interest arose in this work. It should be noted that whereas quaternary phosphonium and arsonium salts can racemise only by the formation of a "dissociation-equilibrium", a sulphonium salt such as (xxii) can racemise by two separate mechanisms. It may form a "dissociation-equilibrium" of the type $[abcS]X \rightleftharpoons abS + cX$. It may also racemise however by direct oscillation of one group about the plane formed by the sulphur atom and the other two groups: for example, if the ring system in (xxii) is regarded as being in the plane of the paper, the *p*-chlorphenacyl group must project either above or below this plane, according to the configuration of the sulphur atom. Oscillation of this group between the two planes must cause racemisation. It is noteworthy, however, that our sulphonium and selenonium salts gave no indication of racemisation, but the telluronium salt did tend to racemise during recrystallisation and we were unable therefore to obtain it in a state of optical purity. The order of rotation of our compounds was high: the sulphonium picrate corresponding to (xxii) had $[M]_D -242^\circ$, the selenonium picrate had $[M]_D -533^\circ$, and the telluronium picrate had $[M]_D -632^\circ$: we had evidence that the latter compound if optically pure would have had a rotation of at least 750° . Furthermore, these compounds form the only known series of three eutropic optically active compounds, a eutropic series of compounds being defined as a series of compounds consecutive members of which differ only in that they contain consecutive elements of any one sub-group in the Periodic Classification.

Another type of stereochemical study which owes much to Pope's early work and inspiration is that of spirocyclic systems. Van't Hoff had predicted in 1875 that an allene compound of type (xxiii) should be capable of existence in optically active forms. Pope in his Manchester days was attracted by this possibility, but the synthetic difficulties in those days were formidable. Consequently in 1909, in collaboration with Perkin and Wallach, he synthesised methyl-*cyclo*-hexylidene-4-acetic acid (xxiv). This compound is stereochemically similar to a true allene compound: it can be regarded as an allene derivative in which one of the two-membered rings has been expanded into a six-membered ring. This compound shows molecular dissymmetry, and thus Pope and his co-workers were able to resolve it into optically active forms. The considerable difficulties attending the synthesis of



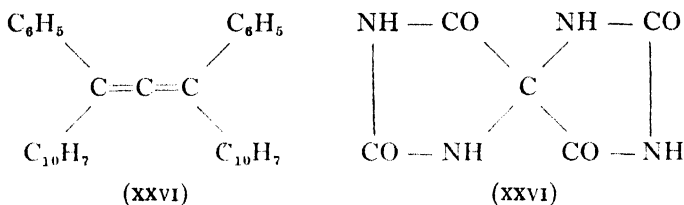
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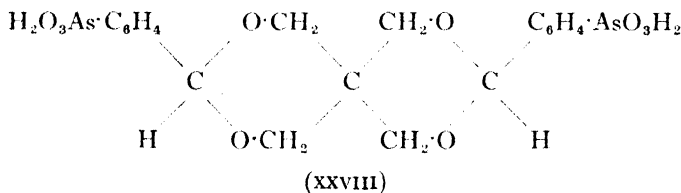
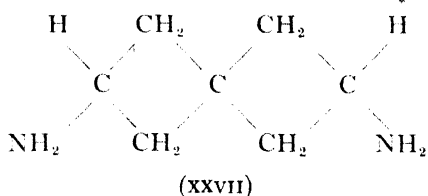
(xxiv)

a suitable true allene compound were ultimately overcome in the Cambridge

laboratories in 1936 by Maitland and Mills, who prepared and resolved $\alpha\gamma$ -diphenyl- $\alpha\gamma$ -di-1-naphthyl-allene (xxv). It should be noted that compounds (xxiv) and (xxv) are really special cases of a spirocyclic compound, *i.e.*, of a compound in which two rings are united by an atom common to both, the atom therefore having necessarily a covalency of at least four. Pope in his later years turned his

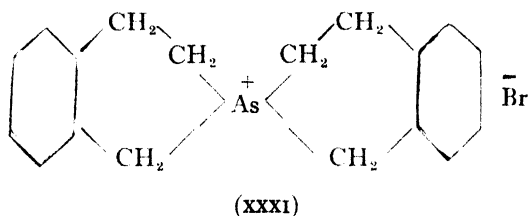
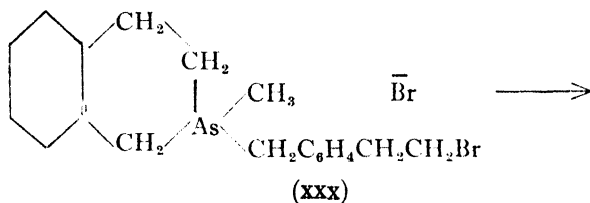
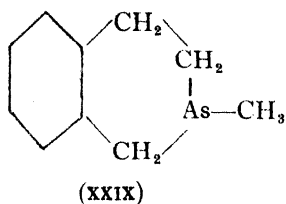


attention more and more to such compounds. In 1931, in collaboration with Whitworth, he prepared and resolved a simple and extremely interesting example of this class of compound, namely, spiro-5:5-dihydantoin (xxvi). A year later, he announced with Janson the resolution of the spirocyclo-heptane diamine (xxvii).

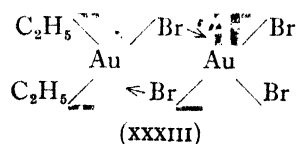
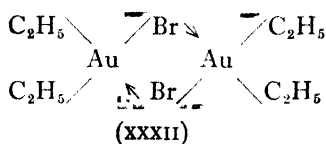


Many similar spirocyclic compounds have since been obtained in optically active forms. One compound which is particularly interesting in view both of the nature of the ring system and of the acidic group used for salt formation in its optical resolution is spirobis-3:5-dioxan-4:4'-di(phenyl-*p*-arsonic acid) (xxviii), which was synthesised and resolved by Gibson and Levin in 1933.

Our work in Cambridge has recently (1946) allowed us to break new ground in this field. Holliman and I have shown that 2-methyl-1:2:3:4-tetrahydro-*iso*-arsinoline (xxix) readily united with our dibromide (1) to give the arsonium salt (xxx), which in turn when heated under reduced pressure lost methyl bromide with the formation of the highly crystalline *As-spiro*-bis-1:2:3:4-tetrahydro-*iso*-arsinolinium bromide (xxxi). This was the first spirocyclic arsonium salt possessing molecular dissymmetry to be prepared. We were able to resolve it without difficulty and to obtain the corresponding iodides having $[\text{M}]_D + 342^\circ$ and -344° . It should be emphasised that our arsonium salt (iv) owes its activity to the asymmetric arsenic atom it possesses, but the salt (xxxi) does not possess an asymmetric atom and its activity is due to the dissymmetry which the molecule itself possesses.



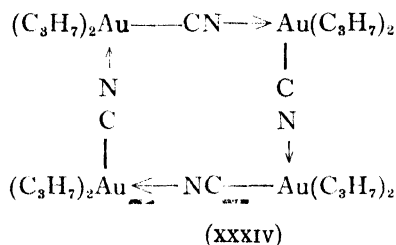
One further chapter of stereochemistry which sprung from Pope's early work must be discussed. In 1907 Pope and Gibson described the preparation of diethyl-gold bromide, of composition $(C_2H_5)_2AuBr$, and in 1909 Pope and Peachey described trimethyl-platinum iodide, of composition $(CH_3)_3PtI$. These compounds were notable in that they were the first known compounds in which organic groups were linked directly through their carbon atoms to gold and platinum respectively. Many years afterwards (1935-1942) Professor Gibson returned to the study of these and other similar gold compounds, with strikingly fruitful results. He showed that "diethyl-gold bromide" was actually a covalent "double molecule" of structure (xxxii), and that in Werner notation it should be termed tetra-ethyl- μ -dibromodigold: furthermore, it was shown by X-ray crystal analysis that the molecule was flat, *i.e.*, that the 4-covalent gold atom has a planar configuration, and the inter-valency angles were determined. This work led in turn to the investigation of "mono-ethyl-gold dibromide" which had also been prepared in 1907 and which was now shown to have a similar planar double structure (xxxiii); in this case the



molecule could theoretically exist in *cis* and *trans* geometric isomers. Only one form was detected, however, and it was shown by dipole measurements that this form has the *cis* structure (xxxiii). Compounds of aliphatic phosphines and palladium dichloride and dibromide, similar in general type to the gold compound (xxxiii),

had been prepared by Mann (1936-1938) but here the only form detected was shown by X-ray analysis to have the *trans* structure, each palladium atom being linked to one phosphine group.

Gibson and his co-workers have shown also that the compound known earlier as "di-*n*-propyl gold cyanide", of composition $(C_3H_7)_2AuCN$, has a very interesting structure, particularly in its stereochemical aspects. Molecular weight determination showed beyond doubt that this compound has the molecular formula



$[C_3H_7)_2AuCN]_4$, and evidence was adduced that its structural formula was that shown in (xxxiv). The configuration of the gold atoms demand, of course, that this molecule, with its novel twelve-membered ring structure, shall also be planar. Professor Gibson has obtained many other novel and interesting organo-gold derivatives, some containing aliphatic diamines and others containing sulphato- and dicarboxylato-groups, but the above is sufficient to indicate the very fruitful development of this branch of stereochemistry in his hands.

In this lecture I have endeavoured to show the recent developments in stereochemistry which have been largely initiated by Pope's earlier work in four chief directions, namely, his work on quaternary ammonium salts, on sulphonium and selenonium salts, on spirocyclic compounds, and on organic derivatives of the noble metals. Had time allowed, I would have appreciated an opportunity to discuss other branches of stereochemistry in which his colleagues and pupils have been prominent: among these I would particularly mention the work on restricted rotation by Mills and by Turner, and also the very considerable extension of our knowledge of asymmetric transformation and induction by Turner and his co-workers.

THE CHAIRMAN: Ladies and Gentlemen, his first authentic pronouncement on stereochemistry was made by Pope in the rooms of this Society. That was in 1901, when he gave the Cantor Lectures of that year. I think it will be extremely interesting to read Dr. Mann's lecture after reading those three Cantor Lectures. The development which has taken place during the last fifty years is a most remarkable one, and I think we are indebted to Dr. Mann and his co-workers for doing so much to extend the stereochemistry of elements other than carbon—a subject in which Pope remained interested all his life.

I do not want to take up your time, but I would like just to say that I think that we have had what is a really classical account of these developments which have taken place in the field in which Pope ploughed, shall we say, the first furrow, and I think the Society is greatly indebted to Dr. Mann for his extremely well-delivered and beautifully illustrated lecture. I ask you to accord your thanks to Dr. Mann.

After the vote of thanks had been carried by acclamation, the meeting then terminated.

THE HOUSE OF TATA—
SIXTY YEARS INDUSTRIAL DEVELOPMENT IN INDIA

By Sir FREDERICK JAMES, O.B.E.

Joint Meeting of the India, Pakistan and Burma Section of the Society with the East India Association, Thursday, May 6th, 1948

Sir HOMI MODY, K.B.E., *in the Chair*

THE CHAIRMAN: My business this afternoon is very simple. It is to introduce to you Sir Frederick James, the author of the paper. I do not know how many of you are aware that he has played a very notable part in the political development of India in the last fifteen or twenty years. He was a member of the Central Legislature and of innumerable committees and public bodies, and those who were associated with him, as I was for very many years, valued his sound judgment, his knowledge and experience and his capacity for studying every problem from every conceivable angle. It may be that his views were in advance of those of his own community, but that was not his fault and I think it should be placed to his credit. I may say, without bringing in the bias of an old friend, that Sir Frederick James rendered very meritorious services to the country of his adoption. I hope that while he is here, though in another capacity, he will have equal opportunities of doing the sort of work for which he is so eminently suited.

The following paper was then read:

The House of Tata was founded sixty years ago, but the founder of the firm, Jamshedji Nusserwanji Tata, was born in 1839, just after Macaulay had left India to write his famous History of England. This Paper, therefore, is partly the story of India's industrial development, and partly the story of one of the most remarkable figures of the nineteenth century. There are plenty of books about Viceroy, Governors and missionaries, the political history of the Indian continent and India's social, religious and rural problems; but there is a scarcity of literature on India's industrial development and on the lives of Indian pioneers in science, industry and education. I ought to mention that a very readable account of The Life of Tata was written by one Mr. F. R. Harris, and published in May, 1925, by the Oxford University Press; unfortunately it is, to-day, out of print.

Jamshedji Tata came of an unbroken priestly line, and after passing out from Elphinstone College in Bombay in 1858, the year the British Crown assumed sovereignty over India, he was articled to a solicitor, but did not complete his articles and shortly after joined his father's trading firm, whose business was general merchandise. He took special interest in developing trade with China, exporting and importing tea, silk goods, camphor, copper, brass and Chinese gold, and visited the firm's Hong Kong and Shanghai Branches to gain experience. When the American Civil War caused a boom in the Bombay cotton market, one of those booms to which Bombay is prone, he and his father joined the Asiatic Banking Corporation which was floated on the high tide of prosperity, and the son went to London to establish an agency for the firm. While he was there, the tide ebbed, and with it the Bank, and he found himself in an extraordinary position in a strange land, with credit impaired and a bag-full of worthless scrip. The frank and able way in which he faced his creditors and the banks greatly impressed everyone, and they appointed him liquidator of his own firm on £20 a month! On his return to Bombay, something was salvaged from the wreck, but his father had

to retrench severely. Fortunately, the firm's credit was re-established during the next three years. A share in the lucrative contract for the commissariat of Napier's expedition to Abyssinia in 1868 restored the family fortunes, and Tata was able to spend four years in England, where he was fired with the ambition to manufacture textiles in India.

When he came back to Bombay, he, with three others, bought a liquidated oil mill and converted it into a spinning and weaving mill, naming it Alexandra after the then Princess of Wales. Two years later it was sold at a fair profit, and he returned to Lancashire to make a much more intensive study of textile technique and organisation. The result of this trip was a deepened conviction that India was a suitable and splendid field for the development of this industry. At that time, it was wholly confined to the city of Bombay. Most of the existing fifteen textile mills were inefficient and out of date, and conditions of labour were very bad. Tata therefore decided to establish new and up-to-date mills at Nagpur, in the Central Provinces, hitherto an undeveloped area, on the edge of great cotton-growing fields. In 1874 the Central India Spinning and Weaving Company was floated, with a capital of £115,000. The mills were opened on the 1st January, 1877, and called the "Empress Mills" in honour of Queen Victoria who was proclaimed Empress of India on the same day. They were the first to incorporate "air-conditioning" apparatus, "ring-spindles" and automatic sprinklers. Mr. Tata was also the first to introduce a bonus system and a provident fund, and to provide amenities for his employees.

The mills prospered and expanded, and so did Nagpur. I have not time to describe Tata's subsequent career in detail, or to recount all the incidents of his astonishing life. But the Empress Mills laid the foundations of his personal fortune, and those of the House of Tata. He enjoyed to the full his growing wealth and the amenities it commanded. He was generous and hospitable. He travelled far and observed and acquired much. Yet wealth to him was never an end in itself. He expected every industry he established to pay good dividends, but he also thought of the prosperity it might bring to his country. He wanted to make India a great industrial power and to this aim he brought a restless and inventive energy, a prophetic insight and a high conception of service.

During his many travels he compared his country with the great industrial nations of the West and came to three conclusions:—

First, that no country which did not manufacture iron and steel could become industrially great;

Second, that no sustained economic growth is possible without the aid of science and technical education;

Third, that the prosperity of Bombay, of which he was inordinately proud, depended upon the provision of cheap electric power which would release it from its bondage to the distant coal fields of Bengal and Bihar.

Montaigne said that "a powerful imagination produces the event". From Tata's imagination flowed three great and practical projects: the iron and steel works at Jamshedpur, the great hydro-electric system which makes Bombay virtually independent of coal, and the Indian Institute of Science at Bangalore, which has produced some of India's finest scientists and technicians.

The story of each is a romance in itself. It took Tata twenty-five years of investigation and prospecting before he found the village of Sakchi in the jungles of Bihar, near ore-fields, within easy reach of the Jherria coal fields, only 150 miles from Calcutta and with an unfailing water supply from two rivers at the junction of which it was situated. Now it is the home of the largest single self-contained steel plant outside the U.S.A. and the U.S.S.R.

As early as 1875 Tata foresaw the value of water-power to industry, and before his death he had made plans for driving the Bombay mills by combined electric and hydraulic energy. But the foundation stone of the Lonavla dam was only laid by Lord Sydenham in 1911, and not until 1915, seven years after Tata's death, did Lord Willingdon first switch on the power.

Tata's ideas for the development of scientific and technical education were formulated in 1889, as the result of a speech by Lord Reay, Governor of Bombay, in his capacity of Chancellor of the University. They were accepted by the Government of India with commendable celerity ten years later, in 1899, and with them an unconditional gift of £234,000. But it was not until 1911, seven years after his death, that the Maharaja of Mysore laid the foundation stone of the Indian Institute of Science in Bangalore; and that the first students were admitted.

Apart from these great projects, Tata's interests were many and varied. He created an endowment which was subsequently developed and enlarged by his sons for financing training abroad for the I.C.S. and the professions; he applied the findings of science to the growth of cotton and other crops; he introduced sericulture into India and was thus the pioneer of an industry for which Mysore has since become famous; he floated a company for the reclamation of Back Bay; he experimented in deep sea trawling and prepared a scheme for refrigeration on a large scale; he anticipated the needs of modern travel by building the Taj Mahal Hotel at a cost of £300,000, at a time when such a venture was regarded by his contemporaries as a "white elephant"; he started and operated an Indian shipping line between Bombay and the Far East, until it was driven off the high seas by the deadly and dubious competition of established shipping companies.

Although his achievements during his life time were many, his greatest visions were only realised after his death. He was, in every sense of the word, one of the makers of modern India. He saw Indian industry emerge from its primitive simplicity and begin to forge ahead. If to-day India ranks as one of the great industrial powers of the world, though still far behind many western countries, with fewer reserves of skilled man-power and natural resources, it is largely due to Jamshedji Tata—eminent Victorian and business patriot.

The first Indian cotton mill was established in Bombay in 1851; twenty years later there were twelve, mostly owned by Parsees. Textile manufacture was the first large-scale industry to be established with Indian capital and management, and in its development the House of Tata built up its resources and experience.

The firm of Tatas was established in 1887 as a private trading concern, with Tata, his two sons Dorab and Ratan, and a cousin R. D. Tata, as members. It had a modest capital of £1,575. India was then on the eve of great industrial revolution. The inauguration of the Suez Canal in 1869 had opened the gateway to India. Railway and road communications were spreading, great irrigation works constructed,

canal colonisation started, and a system of famine relief developed. The years 1858 to 1900 have been called the period of the "opening-up" of India. This period also saw the development of the cotton and jute mill industries, the opening of the Bengal coal-fields, the establishment of engineering works and the rapid extension of tea and coffee plantations. With the turn of the century, the pace accelerated, and paper, brick, hardware, soap, cement, rice and flour milling and many other industries grew in importance. India's power resources of coal and oil were augmented by great hydro-electric schemes, and, under the impetus of the Swadeshi movement, rural industries and handicrafts were once more encouraged and developed. The period between the two wars saw prosperity and depression alternating, following the general course of world trade.

I have pointed out that textile manufacture laid the foundation of the House of Tata. It is still one of its principal activities. Sixty years ago the Empress Mills were just established on a satisfactory dividend paying basis; then came the Swadeshi Mills, started in 1886 for the manufacture of finer cloth; then the Ahmedabad Advance Mills, which reverted to Tata in 1903 as the result of foreclosing a mortgage; and the Tata Mills in 1913 completed the group, which to-day has 286,000 spindles, 7,100 looms, 37,000 employees and a capital of £6½ millions.

In London the name Tata is generally associated with steel. This key industry was not started without many difficulties, all of which were overcome. Once the raw materials were found, and the ideal site selected, the last obstacle was finance. Many lakhs of rupees had been spent in development, and Tatas decided to raise fresh capital in England. They failed. The City of London had little faith in the project. Fortunately India had just launched the Swadeshi movement, and it was decided to ask Indians to subscribe the necessary capital. The issue was announced and the result is best described in the words of a foreign observer: "From early morning till late at night the Tata offices in Bombay were besieged by an eager crowd of investors. Old and young, rich and poor, men and women, they came, offering their mite; and, at the end of three weeks, the entire capital required for the construction requirements, £1,630,000, was secured, every penny contributed by some 8,000 Indians".

In 1907 the Tata Iron and Steel Company was launched, and in 1914 steel was being produced on a commercial scale. The first world war saw an immense growth in range and output; the second world war extended this to armour plating and all kinds of special steels which protected the gallant Indian troops on many a battleground.

Tisco, as for short the company is called, owes much to the technicians who came from America and Europe in the early days. To-day very few remain. Indians have been trained, many in the Jamshedpur Technical Institute, out of whose 310 students 210 now hold responsible jobs in the company, the direct and detailed management of which is now in the strong and capable hands of Sir J. J. Ghandy. The works now produce sheets, plates, bars, structurals, rails, sleepers, fish plates, wheels, tyres and axles for railways and agricultural tools. There are also valuable by-products such as coal tar, sulphate of ammonia, and benzol. Then there are smaller companies located near the Steel Works and associated with them, which make tin plates,

wire rods, nails, bolts and nuts, electric cables, steel mill rolls and castings. The Steel Company also has its own ore-mines, quarries and collieries.

The manufacture of steel in what was once a Bihar village meant building a new town from scratch. In its planning the advice of the Sidney Webbs and Professors Hobhouse and Urwick of the London University was sought, and they laid down a scientific programme. To-day Jamshedpur, so named by Lord Chelmsford in 1919, is a well-planned garden city of 150,000 inhabitants with its parks, gardens, ornamental lakes, controlled markets, hospital and dispensaries, schools, dairy farms, cinemas, hostels, hotels, and last, but not least, an Indian coffee house. The high standard of its public services may be due to the fact that Jamshedpur is run by the Company and has not had the luxury of a self-governing municipality! The capital cost of the town up to date is £2½ millions and the annual cost of administration is about £500,000.

The third pillar of the House of Tata and project of its founder is the hydro-electric group of companies, which produce to-day through their three great power stations one-third of the total electrical energy in India. Here again the City of London rejected the first attempt of the promoters to raise £1½ millions, and in 1910 the requisite capital for the first development stage was found in India. The first unit, the Tata Hydro Electric Power Supply Company, began operations in 1915; the second, the Andhra Valley Power Supply Company, in 1932; and the third, the Tata Power Company, in 1937. Tata Sons Limited were the managing agents of these companies up to 1929 when, with a view to placing the management in the hands of an organisation specialising in the operation of public utility companies, they entered into a partnership with the American and Foreign Power Company Incorporated, and a new company was formed called Tata Hydro-Electric Agencies Limited, which has been responsible for the operation of these great units for the past eighteen years.

The power generated is transmitted through a grid system over 275 route miles of lines to Bombay and Poona, and is distributed to industrial concerns in Bombay City through 200 miles of underground cables. Power is supplied to textile mills and other industrial undertakings in Bombay and elsewhere, to the G.I.P. and B.B. and C.I. Railways for electric services, to B.E.S.T. and eight other distributing companies for retail distribution. In the year 1945-46 the electricity supplied was 58 per cent. more than that supplied in any pre-war year.

Cement is another basic industry pioneered by the House of Tata. The Indian Cement Company Limited was floated in 1912 with a paid-up capital of £200,000, with a factory at Porbandar in Kathiawar. A second company was established in Hyderabad in 1925. Other companies came into the field, and in 1936, in order to improve production, consumption and marketing, and to avoid uneconomic competition, a manufacturers' combine was brought about by the late F. E. Dinshaw, known as the Associated Cement Company (A.C.C.) with a capital of £5¼ millions, whose Chairman is Sir Homi Mody, happily with us to-day, who has taken a keen interest in the cement industry.

The House of Tata was also responsible in 1919 for promoting the New India Assurance Company Limited, to meet the growing needs of the insuring public in India. Sir Dorab Tata was its first Chairman, and Mr. A. D. Shroff, one of the

Directors of Tata Sons, is its present Chairman. As New India is now an independent institution functioning under its own Board, I will say no more about it except that it is to-day the largest composite Indian assurance company transacting all classes of insurance business, with branches throughout India, the Middle East and the Far East.

In 1918 the Tata Oil Mills Company was promoted to produce crude vegetable oils for export and a mill was built at Ernakulam in the Cochin State. Unfortunately, as soon as production commenced, the United States put on a prohibitive tariff in favour of the coconut industry of the Phillipines, and closed the chief market for Indian oil. A complete change in policy was required, and the company decided to produce finished goods for the Indian market. The first oil-refining and deodorising plant in the country was installed, and in 1924 "Cocogem" was on the market; later "Pakav"—a vegetable oil substitute for ghee. Then came soap. It was not generally known that the annual per capital consumption of soap in India is $\frac{3}{4}$ lb. compared with 20 lbs. in Great Britain and 25 lbs. in the U.S.A. So Tata went in for soap manufacture. First came the washing soap "501", whose advertisement is seen around Bombay, sometimes disfiguring the scenery of the Swawors and then high-grade toilet soaps, and other toilet preparations were prepared, hair oils, shampoos, shaving soap, eau de cologne, and perfumes. Tatas produce some of the best eau de Cologne on the market, unhappily not available in England! Consumption soon outstripped capacity and the second mill was built in 1938 at Sewri near Bombay. With a rising standard of living, and a growing demand for these products, there is room for still greater expansion.

In the nineteenth century, steel was the foundation of industrial progress; to-day it is chemicals. One of the more recent and difficult enterprises of the House of Tata is the manufacture of heavy chemicals. Tata Chemicals was floated in 1939, and the salt works at Okha, one of the Kathiawar ports in Baroda, were purchased. Orders for machinery were placed in Europe, Great Britain and the U.S.A., but owing to the war deliveries were hindered and delayed. Some of the plant had exciting and romantic experiences before arriving in India. The works were constructed at Mithapur, an arid and lonely place a few miles from Okha. The task of putting up a highly technical plant and of building a new industrial town during the war was immensely difficult. But the first stage was completed in 1943, when soda-ash, caustic soda, bleaching powder, zinc chloride, liquid chlorine, magnesium chloride and the ubiquitous and useful epsom salts were produced. Nothing was more courageous or persevering than the efforts of those who first worked at the enterprise. They faced endless difficulties, but overcame them because, convinced that alkalis are "the germ cells of industry", they felt they were helping to give India the means whereby she could become a modern industrial State.

Plans for another great enterprise have not been made. An agreement has been reached with one of the largest dye-producing concerns in the world, Imperial Chemical Industries, by which that great organisation makes available to Tatas the information and technical assistance necessary to establish in India a dyestuffs industry which will, after a period of years, be owned and controlled by Indians. Thus another important stage in the industrialisation of India will be reached.

One of the lesser-known romances of the House of Tata is the development of

its air line, known as "Air-India". The centre of this story is our present Chairman, Mr. J. R. D. Tata, a keen and much experienced pilot. Up to 1930 there was no regular internal air service in India. In 1932 Tatas started an aviation department, with the late Mr. Neville Vincent in charge, and a weekly service between Karachi and Madras *via* Bombay, was established. This started with two light single-engined aeroplanes, two pilots (of whom Mr. Vincent was one), one ground engineer, and a few unskilled assistants. Thanks to the energy, faith, technical skill and organising ability of both Mr. Tata and Mr. Vincent, the experiment succeeded and even the Government of India became air-conscious! Services were increased and extended until in 1939, with the inauguration of the all-up Empire Air Mail scheme, five services a week were being operated between Karachi and Colombo, two between Bombay and Delhi, and one between Bombay and Trivandrum *via* Goa and Cannanore. The war interrupted this development, aircraft were requisitioned and the company was called on to perform emergency tasks such as the evacuation of civilians from Baghdad in 1941. After the war, larger machines were purchased from the U.S. Foreign Liquidation Commission in India, and air travel spread with astonishing speed. To-day, Air-India are operating daily services between Karachi and Colombo, Delhi and Bombay, Bombay and Calcutta, and Madras and Trivandrum; and the staff of 1,900 includes 60 pilots, 25 radio operators and 50 air hostesses.

India is now to enter the field of international air transport, and a new company has been formed called "Air India International" in which the Government of India hold approximately 50 per cent. of the shares. Its purpose is to establish a regular air service between London and Bombay, *via* Cairo and Geneva, with long-range, high-speed, four-engined aircraft of the most modern type. Air-India has been chosen to operate the service, and thus will have the honour of carrying the flag of the Indian Dominion on the first Indian regular service to arrive at Heath Row early next month. Incidentally, this represents an interesting experiment in joint State and private enterprise.

While on the subject of transport I may mention the Tata Locomotive and Engineering Company which was established in 1945, with a paid-up capital of £1½ millions, for the purpose of manufacturing locomotives and locomotive boilers, under contract with the Government of India. This company has also undertaken, in association with a well-known British concern, the manufacture of road rollers for Government's road development programme and has plans for other heavy engineering work, such as the manufacture of agricultural machinery and components for motor cars and trucks.

Capital in India has, until recently, been shy and reluctant to take risks. In order to help investors and to finance sound industrial ventures, Tatas established in 1937, the Investment Corporation of India with a paid-up capital of £1 million odd. Among its subsidiary companies is the National Radio and Engineering Company, which has succeeded in manufacturing an inexpensive three-valve radio called "the people's set" and which, in association with a progressive British radio manufacturing concern, now proposes to manufacture a wide range of radio and inter-communication sets, components and other ancillary items. Other subsidiaries are the Indian Standard Metal Company, which recovers virgin non-ferrous metals

from scrap, converting them into alloys and bearing metals of various specifications, and Pickers Limited, which manufactures pickers for textile mills, hitherto imported from abroad.

The Investment Corporation, with Tata Sons, has also promoted the Investa Industrial Corporation with a paid-up capital of £75,000, to promote small-scale but important industries such as the manufacture of lathes, drilling, polishing, punching and shearing machines, and enamel hollow-ware.

I have hardly time to mention Tata Aircraft, formed during the war, first to make Tiger Moths for the Ministry of Aircraft Production, then Horsa Gliders and then, when those projects were abandoned, to assemble and overhaul aircraft and engines for the Air Forces in the Indian and S.E.A. Commands. The company is still in existence, making a final disposal of American surplus aircraft stores.

I have almost completed my rapid survey but there are two matters I wish to mention before I conclude.

First, when Jamshedji Tata founded the Empress Mills, he laid down as a principle that the poorly paid worker is not the cheapest, and that decent wages, healthy conditions of work, and education are the key to efficiency. To that principle the House of Tata has endeavoured to adhere. The well-planned towns of Mithapur and Jamshedpur, the workers' colonies in other centres, the profit sharing scheme of the Iron and Steel Company represent a new deal for labour, often ahead of legislation or practice. Pioneering in industrial relations is as interesting, exciting and important as pioneering in industrial development.

And secondly, in one of the corridors of Bombay House, the headquarters of the House of Tata, the doors are marked with the names of the great charitable trusts which have been established by the Tata family. The House is unique in that about 85 per cent. of the capital of the parent company—Tata Sons Limited—is held by these Trusts, whose income is used for philanthropic, educational and scientific problems. They have built, equipped and endowed the Tata Memorial Cancer Hospital in Bombay, the first of its kind in India; established an Institute of Social Sciences which trains students to deal with the many social problems of a changing India; set up the Institute of Fundamental Research for research in the problems of physics, mathematics and nuclear energy; founded a chair at the London School of Economics for research into the causes of poverty and a chair of Sanskrit at the Bhandarker Institute; contributed generously to the laboratories of the School of Engineering at Cambridge; financed awards to Indian and foreign research scholars for investigations which alleviate human suffering generally, and in particular, research into diseases of the blood; endowed the Indian Institute of Science in Bangalore, and assisted hundreds of Indian students to obtain advanced professional and technical training abroad.

The Trusts total nearly £4 millions, and they have spent since their establishment about £1½ millions. They symbolise Jamshedji Tata's attitude to philanthropy. He was sympathetic and generous, but said that "what advances a nation or a community is not so much to prop up its weakest and most helpless members, as to lift up the best and most gifted so as to make them of the greatest service to the country". "This", he said, "is constructive philanthropy".

In this necessarily brief survey of the beginnings and developments of this, the

largest single aggregation of Indian industry, with a total capital investment of £62 millions, I have not had time to refer to its ups and downs, its mistakes, and its costly and unprofitable ventures, or to its detailed organisation. It has throughout these years striven to fill the serious gaps in India's economy, and to meet the national needs. Thus it may claim to be not only a great industrial enterprise, but also a national asset.

As with organisation, each company is directed by a Board of Directors consisting of representatives of Tatas and leading industrialists and financiers not connected with Tatas. Till recently the "parent" firm, Tata Sons, were the Managing Agents of these concerns, at whose disposal they placed the financial credit and the managerial and technical experience gained through sixty years of industrial enterprise. In order to separate the Managing Agency business from the other activities of the firm, Tata Sons formed in 1945 a subsidiary company, Tata Industries Limited, wholly owned by them, with a capital of about £1½ millions, to take over the managing agencies previously held by them.

What about the future? I cannot do better than quote from a message by the present Chairman of the House of Tata, Mr. J. R. D. Tata, which was sent to all employees of the organisation on Independence Day, August 15th, 1947.

"We have overcome the crisis of a devastating war and of our own political problems, but as great a crisis is now upon us—the crisis of inflation and economic collapse which threatens to engulf us all. Its roots lie in the combination of increased purchasing power and dwindling production. Our people have more money to spend but less food, produce and goods on which to spend it. The slogan: "Produce or perish" applies to India even more than to Britain to-day. The output of almost everything that our country produces is steadily declining instead of rising, and the law of supply and demand is inexorably pushing up all prices. There is only one solution to our problem. We must produce more—more food, more cloth, more steel, more materials of all kinds to build the schools, the hospitals, the dams, the factories, the roads and the railways, and all those other things that are indispensable for the health and comfort, the happiness and security of our people. If we fail, we shall also fail miserably in the immense task of building the new India of our dreams, and our dearly bought freedom will be turned into a sham and mockery. . . .

"How do Tatas fit into this picture? The year that marks the independence of India also completes sixty years of their existence. They have been sixty years of service to India and her people. The fruits of their pioneering and enterprise are now held in trust for the benefit of the people . . .

"Let us together harness its resources to the task of national reconstruction and development and thus play our part in creating the better land of which the Poet Tagore, whose birthday it is to-day, has sung: 'Where the mind is without fear and the head is held high'."

DISCUSSION

Sir KENNETH MEALING: I think all of us have listened with very great interest to the admirable paper which Sir Frederick James has read to us on the great House of Tata. The story is the saga of a great man whose genius created great industries of inestimable value to India, and this, I would point out, under private enterprise and whilst India was

under Imperial rule. Without desiring in any way to strike a pessimistic note, I must say that I should be delighted to think that equal opportunities, to be grasped with equal success, lay ahead now that India has achieved full independence.

I was particularly struck by Sir Frederick's brief reference to the ups and downs and to costly and unprofitable ventures. The adversaries of free enterprise always forget to mention that losses do occur and that, whilst the profits of successful business are criticised, the losses are overlooked; yet often the experience gained from mistakes and from losses provides the background for subsequent success. Personally I should regard it as a great tragedy for India if Tatas and other great and successful industrial enterprises were to be nationalised and made the sport of politics, and I am convinced that, if such policies had obtained during the past sixty years, these great industries would never have come into being.

I was greatly struck by Sir Frederick's quotation from Mr. J. R. D. Tata's admirable Independence Day message to the employees of his great organisation. It contains words of great truth and great wisdom, for India's ever-increasing population presents an enormous problem which only increasing production can solve, and, in my humble opinion, it is the men of practical experience who are also men of vision and patriots who are the best qualified to solve this great problem confronting India.

I have listened with very great interest, as I am sure we all have, to Sir Frederick's account of the House of Tata.

Dr. H. S. BATRA: Sir Frederick James has dealt with the industrial progress of the House of Tata. It has not always been realised that that industrial progress stood India in good stead during two wars. Without the industrial plant, and particularly without the iron and steel works, it would not have been possible to defend India. It would have imposed a great strain on shipping to have had to transport all the iron and steel paraphernalia that is required for war—indeed, it would have been well nigh impossible, because the shipping was not available. At the time when Sir Jamshedji Tata wanted to produce all the steel in India he could, the idea was not very warmly welcomed by the Government of the day, who failed to realise how useful it might be one day; but during the war his vision and foresight were proved to have been well founded, and a great service to the defence of democracy throughout the world.

THE CHAIRMAN: I am sure you would wish to accord a very hearty vote of thanks to Sir Frederick James for his paper. He has drawn a very interesting picture of a really remarkable man who alone amongst his countrymen perceived that, while political education was a necessity and was very good in its own way, India could never be great or economically independent unless she developed to the full her resources in men and materials.

I was particularly struck by Sir Frederick's reference to the products of the Tata oil mills. He seemed to me to become almost lyrical when describing them, and I felt that added to his many other gifts he had the qualities of a high-pressure salesman. I have no doubt that he would have liked to give you all a cake of soap this afternoon, and I am sure you would have appreciated it much more than the brochure which he has provided for you.

Sir Kenneth Mealing, in his very generous references, which were much appreciated by us, as representatives of Tatas, to the work done by that pioneering firm, spoke of private enterprise, and I am sure I could not be in greater agreement with him. I should like to tell him that, as far as I can see, there seem to be even more adversaries of private enterprise in this country than in my own. At any rate I can say this, from my own activities in this direction, that we in our country can put up a fight for the protection of our own interests, and I very much hope that the protagonists of free enterprise will not spare any efforts in this country to hold the fort. I remarked to a man who came to see me from the North that, while your many organisations were doing extremely meritorious

work, they did not seem to be propagandising enough for the protection of the interests which we all believe are essential to the progress of any country.

The vote of thanks was accorded with acclamation.

Sir FRANK NOYCE: It is my privilege to convey your thanks to the Chairman for the way in which he has presided this afternoon. He has already thanked Sir Frederick James on our behalf for his most able and interesting paper.

There are two contributions that I should like to make to the proceedings this afternoon, one by way of anecdote and the other by way of a name.

With regard to the anecdote, probably it is not new to Sir Frederick James, and I had hoped that he would tell it to you. It is the story of a leading British industrialist who, when Jamshedji Tata was seeking capital in London for his great enterprise, told him that he would eat all the steel that was ever produced in India. When he was reminded of that some years later, he said: "Well, my appetite must have been considerably bigger then than it is now."

As for the name, it is that of B. J. Padshah, which is and always will be associated with the Tata iron and steel works. He was a most remarkable man. I had the pleasure of serving with him on the Indian Sugar Committee and of watching his harmless and very lovable eccentricities, which included a rooted dislike to travelling in any vehicle drawn by animals because they had no means of indicating any choice in the matter! He was also one of the few people who really knew something about relativity.

Jamshedji Tata is and always will be the outstanding name in the history of India's industrial development. I do not suppose there is anybody here who did not know something about the great debt that India owes to Jamshedji Tata and his heirs, executors and assigns, including our Chairman and the author of the paper we have heard this afternoon, but that most interesting paper has enabled us all to realise more than we ever did before the great extent of the debt.

As for our Chairman, it is very good indeed to have him presiding this afternoon. To me, at any rate, it means that the war is definitely over and that at last we are able to renew and maintain the links with India which were so rudely shattered for so long a time during the war years. It is very pleasant to find that he has lost none of his old fire and vigour and none of that sense of humour which used to enliven the proceedings of the Legislative Assembly when they very badly needed it. We are most grateful to him for presiding this afternoon.

The meeting then terminated after the vote of thanks to the chairman had been carried with acclamation.

NOTES ON BOOKS

CANADA MOVES NORTH. By Richard Finnie. Hurst & Blackett. 21s.

If ever the Canadian Northland had an enthusiast it is Richard Finnie, one of a very small group who can claim to know its vast spaces intimately. "I was born in Dawson, about 150 miles south of the Arctic Circle, and spent the first three years of my life there; I have since wintered in the Arctic and have travelled over much of the Northwest Territories during the course of eight expeditions since 1924", he relates at an early stage in his book.

Failure to communicate his enthusiasm may be due to the pains he takes to document his story. It is a unique and authentic study of that huge area that spreads fanlike from the populated waistband of North America. Not all readers will agree with his assessment of its potentialities, nor even with his contention that "if Canada's population is to expand it must expand northward"—there are still countless acres that can be cultivated under less rigorous conditions. And although he sticks doggedly to his point, there creeps into his tale at some spots a grudging recognition of the views of many who know all about Arctic cabbages and Aklavik cows: that the north is a territory from which riches may be extorted, not by colonisation, but by strenuous forays from which they can recuperate in steam-heated houses well below the Arctic Circle. He quotes in full C. H. Clarke's amusing "Call of the North", a poem which balances the hardships of northern life against the comforts of civilisation, and ends with the decision: "To hell with the North—it's too blank blank cold"!

Mr. Finnie opens his book by trying to shatter some of the persistent illusions about the North; it's not as unpleasant as you would expect, he says, and if it is cold in winter, at least the inhabitants are prepared for it, and so are not inconvenienced. He describes its exploration, from the sixteenth century voyages of Martin Frobisher down to the scientific expeditions of the present century, and discusses the fur trade and its effect upon the natives. His comments on missionaries and the competition for souls between the Roman Catholics and the Church of England are blunt, and his sympathies obviously lie with the native.

"The natives have been unable to understand and adapt Christian dogmas", he writes, "and on top of that the enticements of imported luxuries—whether they be foodstuffs or mere entertainment—which rival missionaries bestow on prospective converts, tend to breed hypocrisy, just as the traders' seemingly inexhaustible shelves arouse cupidity. The missionary says, 'Thou shalt not lie', and the primitive Eskimo asks: 'What is lying?' The missionary says, 'Thou shalt not steal', and the Eskimo asks, 'What is stealing?' Having learned—and with temptation now in his path—the Eskimo may proceed to lie and steal."

His picture of Eskimo boys and girls, educated in white men's ways and then returned to the north to make a living as best they can, is not pretty, but he admits that the natives "once having tasted the fruits of civilisation, would thank no one who tried to restore them to their pristine state". He contends that the only power that can save them from degeneration, if not extinction, is a forceful rehabilitation programme sponsored by the Canadian Government.

One of his most exciting chapters deals with the resources of the North. The romantic names drum across the pages—Great Bear Lake, Coppermine, Great Slave Lake, Yellowknife, where the frozen earth has yielded incredible mineral riches. He tells about the Mackenzie River oilfield at Norman Wells (but omits an account of the war-time engineering epic that drove a pipeline over 600 miles of chill mountain territory). There is a whole chapter about Yellowknife, the sub-Arctic mining town that in five years grew from a cluster of Indian tents to a town of "houses, stores, warehouses, and mines; aeroplanes taking off and landing; powerboats and barges moving to and fro". The reader is introduced to its inhabitants and learns something of their habits and problems.

"Canada Moves North" was first published in Canada and the United States in 1942, and the text of the present addition is unchanged except for a few additional footnotes. It ignores, therefore, a question that has arisen since the war: that of relations with Soviet Russia, the top layer of the sandwich, of which the United States is the bottom and Canada the filling. As a handbook to those interested in the North, however, it is valuable. There are many fine photographic illustrations. STUART UNDERHILL.

MODERN CHURCH DESIGN. By Richard Mellor. Skeffington. 1948. 12s. 6d.

Some sixty or more years ago the late J. T. Micklethwaite wrote a book called "Modern Parish Churches" which it is interesting to compare with Mr. Morley's book covering almost the same ground. Both writers were architects and both wrote from the standpoint of convinced churchmen. Micklethwaite in his day probably shocked a good many of the contemporary dignitaries and pillars of the Anglican church, but in these more tolerant, if less enthusiastic, times "Modern Church Design" may be studied with profit by church builders of all schools of thought, and it is remarkable to observe the two authors coming to very nearly identical conclusions upon almost every subject they have dealt with.

One observes however some fresh ideas in "Modern Church Design", which would have been regarded as Revolutionary sixty years ago—suggestions to disestablish chancel choirs and to move high altars out of their traditional positions would have shocked clergy who had suffered imprisonment for offences against the Public Worship Regulation Act, and although such changes are not recklessly advocated in "Modern Church Design", it would be unfortunate if the book encouraged reckless experiments by inexpert enthusiasts.

The book is well got up considering present-day circumstances; it contains some photographic plates, none of them of much interest except the frontispiece, which is a fine piece of architectural photography, and in the text there are some very good line blocks, apparently the work of the writer, which are very valuable and practical and have a good deal of artistic merit.

Much advice is given as to the selection of the architect to design the modern church. There are difficulties in devising precautions against incompetence and the best selections are not often made by committees, even of experts, so perhaps it is better that architects should find their own level and the probability is that the best men will come to the top in the long run.

It is urged that a good church should be built by a good man, with which everyone must agree, but it is unfortunately the case that very good men sometimes build very bad churches. For all that Mr. Mellor is on sure ground in stressing the point that a church builder should know as much as possible about the way in which a church is used, including such matters as ceremonial and the convenience of worshippers, who should not be regarded as a mere audience but as having their own part to perform even if it be a silent and inconspicuous one.

The first two chapters of *Modern Church Design* stress the value of church halls and social clubs and touch upon the subject of parsonage houses. The ideal church hall sketched out for us sounds a little Utopian; no doubt such an ambitious building may be desirable in certain parishes, but, after all, the organisation of entertainments is not the only or the chief function of the church and the weekly whist drive is an inadequate substitute for the daily offices.

The ideal parsonage too, with its two bathrooms and attention paid to the comfort of the domestic staff, suggests the piping times of pre-war existence and might prove somewhat burdensome to a married clergyman with a hungry family and an inadequate stipend.

Turning to the description of the requirements of a modern church, Mr. Mellor does not fail to recognise the merits of some of the abler Victorian architects, though he is a severe critic of the general run of Victorian churches, and most people will agree with his condemnation of some of their obvious defects. Whether, however, the fashionable passage aisle plan is the remedy for all troubles is perhaps not quite certain.

We are told that modern materials enable us to build churches of very wide span, but modern materials are not always what they promise to be and there are plenty of modern materials which become terribly shabby after a few years' time. And when you have built your big span are you going to give it proportionate height? If so, how about the cost? If not, how about the appearance, not to mention the acoustics or the lighting?

The fact is that for general purposes it is not practicable to seat a very large congregation in a single nave: the people in the back seats are inconveniently distant from altar and pulpit if the church is a long one, and a nave of a clear width of even 40 feet will hold only twenty people in a row and would require considerable height and massive construction to look and last well. Probably the best churches for acoustic properties are some of the late fifteenth and sixteenth century parish churches in places like King's Lynn and Boston, and on a smaller scale St. Margaret's, Westminster. And this type of building, despite its pillars, will for a church of moderate size provide a maximum accommodation within sight and hearing of and at minimum average distance from the altar and pulpit.

The wide nave type of pillarless seating space generally has passage aisles and a plea is made that these aisles should not be less than 5 feet wide. But if you build passage aisles 5 feet wide and build a nave to hold the entire maximum congregation you hope to gather you may be overlooking the fact that the size of congregations is apt to fluctuate and that very often your big nave will be half empty. Why not then build your nave large enough for your usual Sunday congregations and build broad aisles, not fitted with fixed pews or chairs, but available for excess congregations on special occasions? The moral effect of empty pews is not encouraging and

a more flexible arrangement of seating than that to which we are accustomed may have advantages in more ways than one.

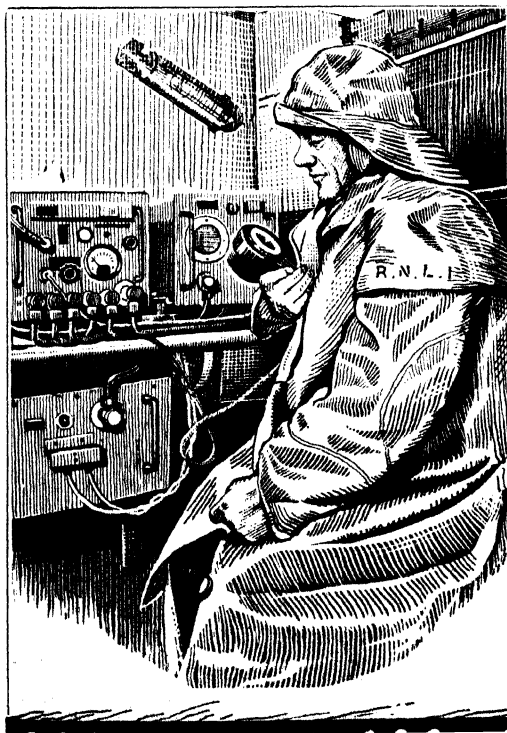
An intelligent use of a traditionally planned church may lead to better results than sensational experiments in planning circular or other abnormal churches.

The advice given regarding the dimensions of church furniture, the width of steps, and so forth, is very sound. There may be some difference of practice in minor details but in minor matters only.

With regard to the length of altars there is a tendency to assume that all medieval altars were extremely long. But this is inaccurate and an examination of the marks and of the remains of medieval altars, in this country at any rate, indicate that there were no fixed rules or customs as to the length of altars at the time most of our churches were built. A very common length for a chapel altar was 5 feet and for the high altar of a country church 7 or 8 feet. It does not however follow that a longer altar is to be condemned. Then again, it is recommended that all altars should stand free of the east wall, but this too is a somewhat novel piece of advice; it may be sound enough but certainly the majority of medieval altars in parish churches were built close up to the east walls of the chancels, and in the days of Queen Elizabeth many hard knocks were exchanged between the advocates of tables placed altarwise and altars placed tablewise, which should warn us not to lay down the law too strictly about such matters.

A chapter near the end of "Modern Church Design" describes the amusing undertaking of setting a Victorian church to rights, a most laudable work in many cases, and the author certainly makes a bull's eye on the target he has created. His task has been the easier as he has not had to contend with advisory committees, a chancellor, a nervous clergyman, the choirboy's Mama who likes to hear her offspring's voice o'ertop the rest, the old lady who has sat in that particular pew for fifty years, the man who knows what he likes and the other man who knows what he doesn't like. All the same, when next the author has to tackle a Victorian interior we shall wish him luck in the gentle art of obstacle racing, which he will certainly deserve on account of his excellent little book.

CHARLES A. NICHOLSON.



LIFE-BOAT FACTS

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No. 7 ROCHDALE

BEFORE 1914 Courtaulds began to study the possibility of creating a new material from which textiles might be woven and knitted. They had already made a great success of continuous filament viscose rayon (then called "artificial silk"), and the use by some firms of waste from this product indicated the need for a properly produced rayon staple, made by cutting continuous filaments into regular lengths in standard deniers.

In time, research established the techniques whereby this viscose staple could be manufactured in bulk and spun into yarn on all types of existing textile machinery (cotton, silk, flax, wool, jute, *et cetera*) and then woven or knitted into a limitless variety of cloths each with its own distinctive qualities.

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Thus Rochdale has played a leading part in introducing this entirely new, home-produced raw material to Britain's textile industries. Since Arrow Mill started to encourage other spinners to use the new product, the British output of rayon staple has increased more than thirty-fold to 84 million pounds a year, a major contribution to the national economy.

Of over 24,000 people directly employed by Courtaulds in the United Kingdom, over 400 work at Arrow Mill, Rochdale, producing spun rayon yarns and exploring even newer fields of research and development.

This is one of a series of statements to inform the public of some part of the contribution made by Courtaulds' industrial enterprise to economic well-being in various districts of the United Kingdom.

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4777

FRIDAY, SEPTEMBER 10, 1948

Vol. xcvi

THE CRAFTS CENTRE

The following is the text of a letter addressed to the Editor of *The Times* which was printed in *The Times* on August 14th.

"THE MAINTENANCE OF CRAFTSMANSHIP

"Sir,—Your recent leading article 'Designers for Industry' indicates the sincere interest now being taken by the Chancellor of the Exchequer, Sir Stafford Cripps, in the maintenance of British craftsmanship. It is in line with the wave of feeling evident among all those who are convinced that our craftsmanship is esteemed the world over and can and should play an important part in our export drive.

"The Board of Trade, appreciating the need and the possibilities of this factor in our recovery, and recognizing the serious risk of the disappearance of the craftsman at this time, has approved the creation of a Crafts Centre of Great Britain, organized by the five major societies for the maintenance of craftsmanship. Further, the Board of Trade has expressed its willingness to help to acquire and convert No. 98, Portland Place, W.1, as the Crafts Centre headquarters. These premises, ideally suited to the purpose, will combine offices and library, display, exhibition, and storage rooms, which will enable the fine work of our artist-craftsmen to be shown permanently to home and foreign visitors. Its existence can, and undoubtedly will, be influential in a steady raising of the standards of craftsmanship and will form a valuable meeting place for craftsmen, where they and their work will be seen as a vital part of our national activities.

"The Crafts Centre will be an independent, non-profit-making body, and the Board of Trade has agreed to make a contribution towards the expenses, provided that the sum of not less than £2,500 a year can be found from other sources. If it is not obtained, there is a real risk that the work of our invaluable craftsmen will be overlooked and their skill and training wasted, and it will be impossible to proceed with this scheme. May we, therefore, appeal to all who feel, as we do, that this is a matter of vital importance, to send a subscription or donation to Miss Evelyn Fahy, secretary to the council, Crafts Centre of Great Britain, 6, Queen Square, W.C.1.

"We are, Sir, yours, &c.,

"FREDERICK BAIN, President, Federation of British Industries; R. S. EDWARDS, Chairman, Council of Industrial Design; HARRY LINDSAY, Chairman of the Council, Royal Society of Arts; ERNEST POOLEY, Chairman, Arts Council of Great Britain; GORDON RUSSELL, Master, Faculty of Royal Designers for Industry; MICHAEL WATERHOUSE, President, Royal Institute of British Architects; ALFRED C. BOSSOM.

"5, Carlton Gardens, S.W.1."

CRAFTSMANSHIP

(VIII) CRAFTSMANSHIP IN THE COUNTRYSIDE

By COSMO CLARK, M.C.,

Director of the Rural Industries Bureau

Wednesday, May 12th, 1948

The Right Hon. LORD CRANWORTH, K.G., M.C., *in the Chair*

THE CHAIRMAN: It is my pleasant and not onerous duty to introduce the lecturer this afternoon, Mr. Cosmo Clark. Very many people are interested in rural crafts, though perhaps some think of them vaguely as interesting relics of a bygone age and associate them with the making of flint arrowheads. They are inclined to think of rural craftsmanship in a historical way and as one of those things that will be of interest because it is falling into decay and will soon be finished. Those people will be surprised to know how greatly this Government, and previous Governments before it, have been endeavouring—and with success—to stop the decline of rural craftsmanship and even to increase it, because there are three reasons at least why it has never been so important as it is to-day.

The first is the economic situation, which has been brought very much to the notice of many of us, although possibly to a majority of people this is only theoretical as yet. The second reason is because of the great advance in mechanisation on the land. That means that there are less horses, less shoeing and less saddlery; but that is more than compensated for by the work required to be done by farmers as a result of machinery, and that work will increase. There is room to-day for a large number of people to keep the machines in order. The third reason is the one I attach the greatest importance to, and that is the question of character-building. I do not think every one realises what a large proportion of our present-day population spend their working hours in making a few small mechanical movements. They move a bottle six inches, they fill it, move it to the left, someone else takes it, they put a top on it, and so on. There are perhaps six or eight movements in all which go on hour after hour. That is vital work, but it is also a soul-destroying life and one cannot be surprised at the people who working in this way have their minds lulled into a state of lassitude and only look forward to the bell ringing to say that their labours are at an end. How different is the position of the rural craftsman. He has no employer to clock him in in the morning; he has no trade union to tell him when to stop work and say how much he must or must not do. He can work when and for however long he likes, and he has his great reward in the knowledge that what he is doing is of value. He sees his work grow under his own hands. He finishes, for example, a bit of thatching or a wrought iron gate, and if he is good he gets more money for it. On the whole I think the remuneration of such men is of a good standard and likely to rise. Above all, it encourages his initiative, his self-reliance and his love of work—qualities that are perhaps wanted more in England to-day than at any other time. I think we may feel this is indeed an important subject.

Only the best man is good enough for a lecture of this kind, and no one is more fitted for it than the Director of the Rural Industries Bureau, Mr. Cosmo Clark, who has been in charge there since 1942. That is not the only thing Mr. Clark is famous for. He served with no slight distinction in the late War, but is better known as an artist. It may surprise you to know that he has three pictures in the present Academy Exhibition, all of which have already been sold. When I listen to a lecture the first thing I want to know is whether the lecturer knows his subject, and there is no doubt that in Mr. Clark we have a real authority.

The following paper was then read:

The subject of this Paper is "Craftsmanship in the Countryside". The title may appear somewhat vague, but the skilled crafts practised by countrymen are so numerous

and varied that one general name for all of them can be misleading and in any case might not indicate what the men are doing. Perhaps "rural craftsmen" is as good a designation as they could have if they must be grouped into a class of their own. Nevertheless, I dislike thinking of them as a group because, like all good craftsmen, they are essentially individuals who bring to bear on their work some characteristic bias or feature which can be recognised by a fellow craftsman, if not by the casual onlooker.

Although the craftsmen to whom I shall refer have much in common, their skills are very different. The number of men practising each craft also varies—some crafts employ very few men, others employ a great many. They are alike in



FIG. 1.—*Blacksmith's apprentice. Setting¹ the timing mechanism on a binder*

several ways, but perhaps chiefly because their work is closely linked to agriculture and for this reason they are usually only to be found at work in our villages and market towns.

Who then are these rural craftsmen who are now regarded as increasingly important to our rural economy? In a moment or two I will show some pictures of these men and their work. A few good photographs will give a much better idea of our subject than any long factual statement. You will see some pictures of blacksmiths, wheelwrights, cart-builders, brickmakers, thatchers, saddlers, potters, hurdle-makers, basket-makers, and many other craftsmen and their work.

There will be many skilled country crafts which will not be included in this review—notably those that properly belong to the work on the farm such as hedging, ditching, dry stone walling and numerous others. These agricultural crafts are of a seasonal kind and are usually practised by men who are employed

by farmers. The craftsmen with whom we are concerned are those who are in business on their own account, although their link with agriculture is usually a close one.

I do not intend during the short time at our disposal to attempt anything in the way of an historical survey of the various crafts at which we have glanced. Each is a study in itself. The story of the origin and development of these country crafts is the story of English social history, embracing the tale through the ages of our farming, the evolution of our cities, and the effect on the life of our countrymen and women of such factors as the Enclosure Orders and the development of scientific knowledge which culminated in the industrial revolution. Suffice it to

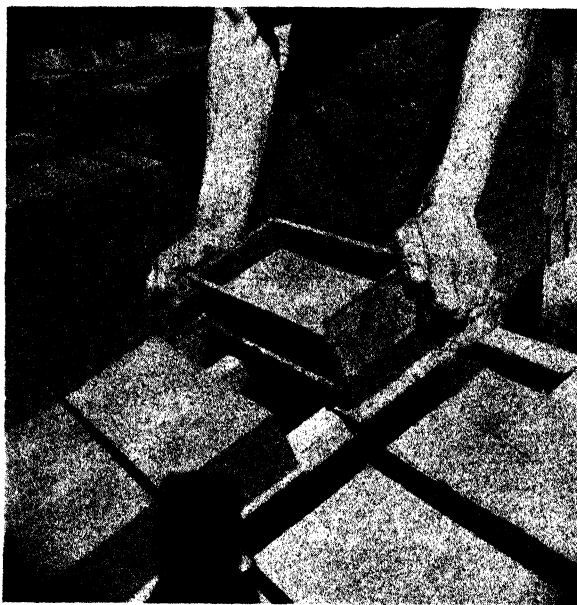


FIG. 2.—*The brickmaker. Removing the mould from the brick*

say that most of these crafts, involving as they do the use of such raw materials as iron, wood, clay, leather and wool, have survived to the present time from those days when the village or small country town was a self-sufficient unit.

Let us look at these crafts in the light of to-day and attempt to assess their present value and future use in relation to our national economy. Let us also bear in mind the position of the rural craftsman in relation to the other craftsmen whose work has been the subject of some of the Papers in the recent "Craftsmanship" series of the Royal Society of Arts.

There has been a marked reduction in the number of rural craftsmen during the last thirty-five years and before this the number employed was on an ever-downward curve. This fact has tended to give the widespread impression that these craftsmen represent the last examples of what have become known as "dying crafts" or survivals of former peasant crafts. They are apt to be looked upon as

picturesque inhabitants of our villages whose presence is an added charm for the tourist or local historian. This quite false impression shows a completely unrealistic approach to the subject and is the result of loose thinking. The part that the village craftsmen is playing in our national economy should be recognised and the assessment of its true value requires proper study.

Imagine yourself able to walk at incredible speed throughout this country probing as you go into the workshops and yards that you will find tucked away in remote villages, hamlets and market towns. Make a note during your wanderings of the output and quality of the work that is going on; keep count of the numbers of men who you will find at work. Observe for whom their service and goods are being provided and whether their market is a local one or one far afield. From Kent to



FIG. 3.—*The wheelwright. Shaping the tenons on the spokes of a new wheel*

Cornwall, up through Wales to Westmorland, by way of that rich agricultural county of Lancashire, across to Northumberland and south again; wherever you wander in the country districts you will find thousands and thousands of craftsmen at work, either providing some essential service or some useful goods. Their workshops are often simple affairs. The key to their output is the skill of the craftsman's hands, his knowledge of his material and the ultimate usefulness of the object that he is making. The character of the local soil will partially determine the particular design of the harrow that the blacksmith makes in a particular district; the shape of some locally made potato-picking baskets is in part due to the oak spales from which they are made from the oak grown in the neighbourhood, and in part to the preferences of the growers for this type of basket.

If we continued our wanderings throughout the country, missing none of the

carpentry shops, the blacksmiths' shops, wheelwrights', cart-builders', boat-builders', furniture-makers', potters', saddlers', brickmakers', thatchers', basket-makers' and the many other craftsmen's establishments, we would soon be forced to the conclusion that the rural craftsmen are not a dying race, that the intricate character of our whole industrial economy is something which cannot be loosely tampered with, and that centralised large-scale industry is not and never will be the complete solution to the problems which arise when considering our national and our rural economy. This is not a conclusion resulting from wishful thinking or of

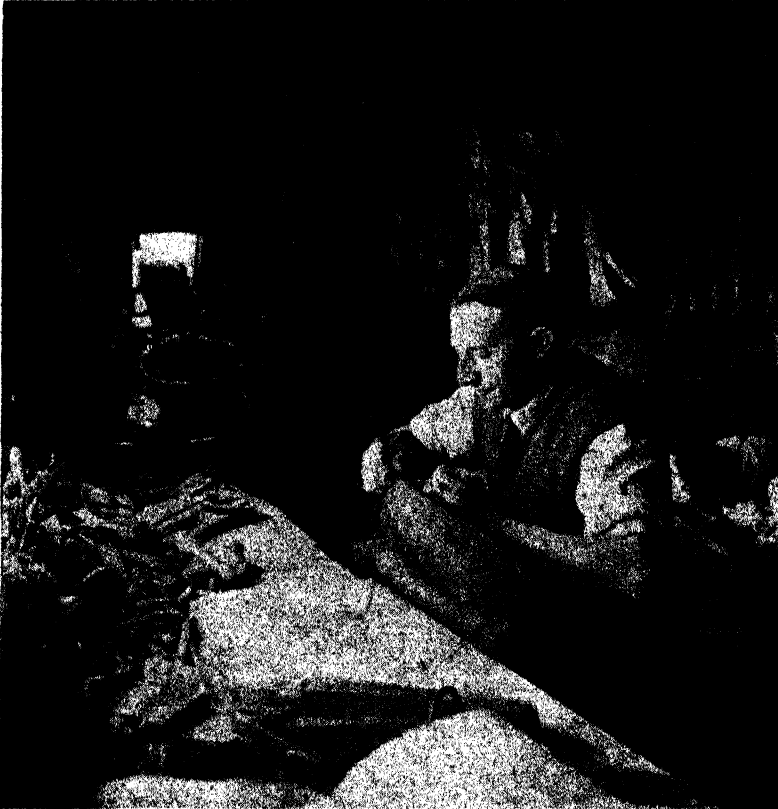


FIG. 4.—*The saddler. Repairing a collar*

a sentimental and romantic attitude to an age which no longer exists, but is a conclusion borne out by studying the worth of the products and services of thousands of country craftsmen and the delicate and intricate machinery of supply and demand in various localities.

At the present time, it looks as if this country's farming had assumed an importance which was likely to continue through most of our lifetime. There is a practical necessity to produce as much food at home as we possibly can. The urge to do this results from dire necessity arising from a primeval need. Every possible measure is being taken to improve the efficiency of our farming methods

and this immense industry is growing year by year, eventually to attain a standard which may well become a model to any.

This development is having—and will continue to have—far-reaching effects in the countryside: a rich and thriving agriculture affects the whole course of life for the rural population. Local services for agriculture are as essential as the services of a general practitioner for an urban population. The workshop round the corner, with modern equipment and staffed by skilled men, will continue to provide a door-step service essential to the farmer whatever type of land he may be farming.

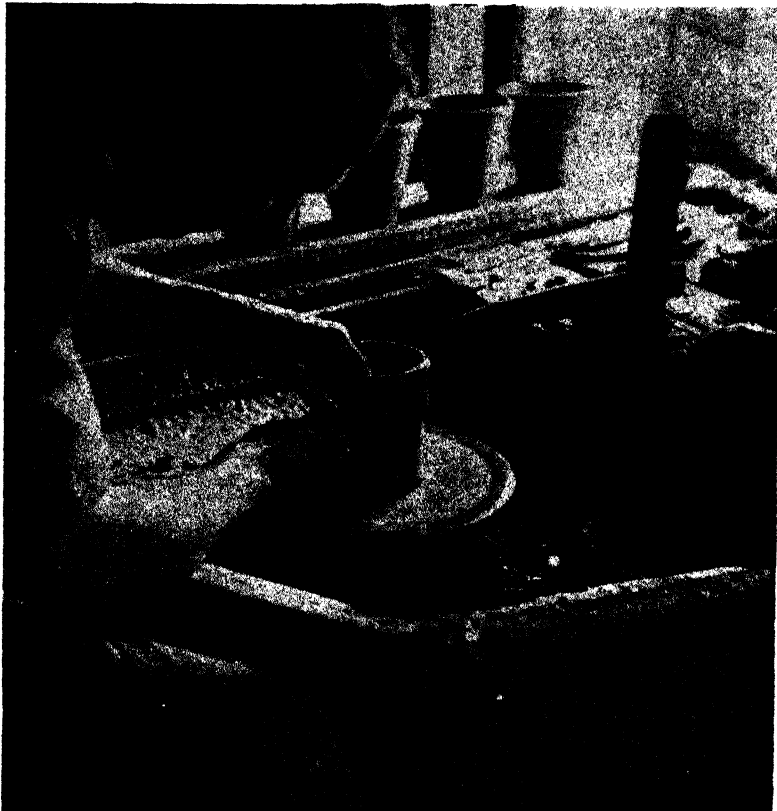


FIG. 5.—*The potter. Making plant pots*

The well-being of the countryman and the development of country industries is linked closely to the development of our farming industry. We can look forward once more to an age in which agriculture will be reckoned as an asset which plays a dominant role in our economy. The farming industry may not be able to produce enough corn, meat, dairy and market-garden produce to feed our population, but it is imperative that it should produce as much as possible and so reduce the need of importing food.

It is within this framework that the rural craftsmen take their place, just as indispensable services and subsidiary industries have sprung up within a densely

populated urban industrial centre. It is not entirely a question of whether mass production, large-scale industry and scientific development will render valueless this or that craft. Many factors have to be taken into account in the complicated and intricate pattern of our national industries, particularly our farming industry in the rural areas. Local conditions such as the availability of usable raw material will often determine the existence and continuance of a small local industry. So will the peculiar quality of the goods be a determining factor in the growth and welfare of a small industry. Let me give only one example. Up and down the country, particularly in the southern half of England, are to be found hundreds of small brickyards. There used to be many more than there are now, but there are still a great many. These yards have produced the bricks with which our brick-built villages and towns were made. There is no question of the quality of these bricks so far as durability is concerned, for they have stood the test of centuries. They happen to be made by hand and the skill in preparation, weathering, pugging and moulding of the local clay is the result of experience handed down through the years. It is to these yards that architects turn when they require a fine facing brick for their buildings. The range of colours and peculiar characteristics vary according to the local clay and the local methods of making, thus providing the architect with a choice for his particular need.

Not many people realise that every brick that you can see in the Battersea Power Station was made by hand in comparatively small rural brickyards. Brickmaking is only one of the many small-scale production units which are to be found in most rural parts of England and Wales.

In 1921 during one of the worst agricultural depressions that this country has ever endured, the Minister of Agriculture, on the recommendation of the Development Commissioners, caused to be set up an organisation called the Rural Industries Bureau. Trustees were appointed under a Trust Deed and they were empowered to take such steps as were necessary to develop and foster rural industries. The purpose was to assist the skilled rural craftsman by providing him with technical facilities for the furtherance of his business and so help him to overcome his difficulties during the adverse conditions which confronted him.

Since then the Rural Industries Bureau has helped many rural craftsmen with technical and marketing problems. The staff of the Bureau, though comparatively small, has developed for rural craftsmen a nation-wide technical service which has undoubtedly been the means of assisting many crafts, and of developing these small businesses so that they can play their part in a modern rural economy. In each village modern mechanised farming demands an engineering service which properly belongs to the blacksmith, but which his traditional skill and the scale of his business was not able to provide. By a system of instructional visits by technicians and a Loan Fund through which up-to-date equipment and machinery could be purchased by the craftsman, many hundreds of village smithies have been developed into small agricultural engineering workshops able to provide a maintenance and repair service for the modern implements now used by the farmer. Whilst providing an up-to-date agricultural engineering service, the smith must continue to render a service for the horse—the horse population of this country runs into millions. Horses must continue to be shod and the farriers' craft is one of considerable skill.

It is not generally realised what degree of skill is required in the shoeing of a live animal.

During the last twenty years there have been many changes and developments which have affected the rural craftsmen's products, his technique and the character of his business. Obviously, what was adequate a hundred years ago for the farmer or for the needs of a rural district may not be suitable at the present day; scientific development and the innumerable benefits derived from big industries must affect

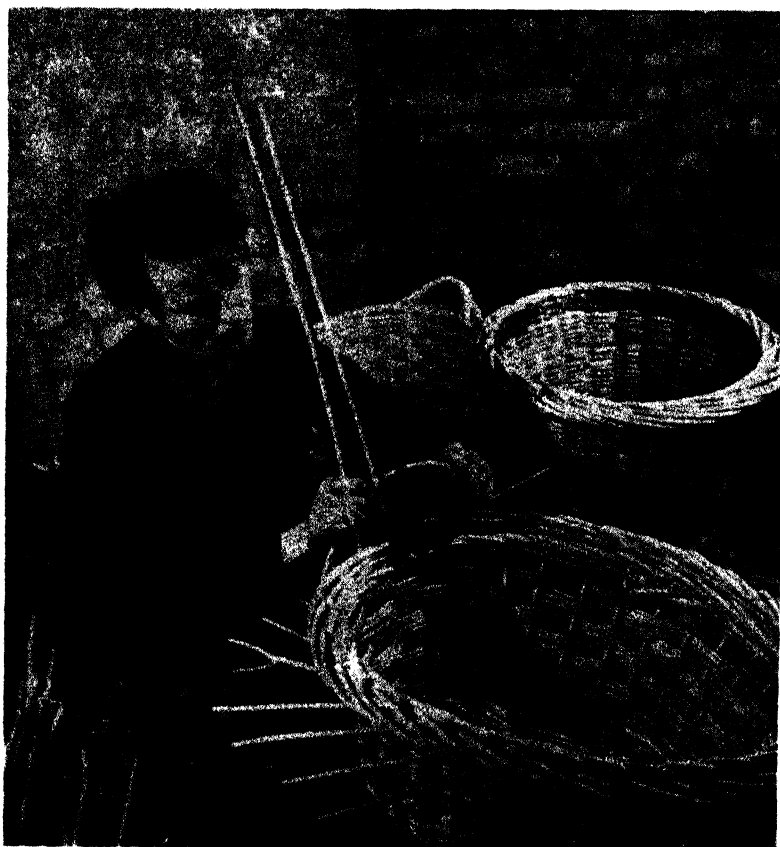


FIG. 6.—*The basket maker. Finishing a fruit basket*

the character and type of craftsmanship practised in the country. Many processes which were formerly manual are better done by machines. This is particularly desirable if the manual process is extremely arduous or dangerous. It is also essential if a small business is to be run on economic lines now that labour is costly and in short supply.

It should be stressed, however, that the many inventions and developments in large-scale industry, which have affected conditions in country districts, have themselves been responsible for new types and standards of craftsmanship. The internal combustion engine was the forerunner of the tractor. The tractor, where it

has replaced the horse, has affected both the craftsmanship and the skill of the man who repairs and maintains it and the design and character of the implements which it has to pull. With the advent of new implements the craftsmanship of the smith has not been obliterated—it has been changed. The opportunity for fine craftsmanship is as great at the present time as ever it was. The nucleus of the vast army of agriculture's servants is to be found in the array of small craftsmen's workshops throughout the countryside. They are probably situated where they are because they were indigenous to that district—if they were no longer needed they would go.

In one respect rural craftsmen are no different from most people; they practise their craft primarily to make a living. Fortunately in the course of their work they have the opportunity to take time, pride and enjoyment in producing things: all these are essential conditions for good craftsmanship. If the work which they do is well done, it is likely that a beautiful object is created. In this they differ from the



FIG. 7.—*The wattle hurdle maker. Adjusting the uprights which form the framework for the woven cleft hazel rods*

artist craftsman whom Mr. Farleigh described in the first paper in this series on craftsmanship. The artist craftsman is certainly more conscious of beauty in his creation than is the rural craftsman. Nevertheless the rural craftsman often produces a beautiful thing to look at, although he had no such motive in mind whilst making it. Fitness for purpose is the principle underlying any good craftsman's creative work, whether he be termed an artist craftsman, rural craftsman or be given any other name.

The countryman is notoriously slow in adopting new processes and absorbing new methods. It is equally true to say that when a new medium is invented, the early attempts to apply it to production lead to many disasters. As an example one can cite the number of articles manufactured in plastics which were proved in time to be unsuitable. It is perhaps as well that the countryman does not embrace quick changes to unproven methods. For example, it has often been suggested that roofing houses and barns by thatch is no longer a practical proposition and that there are many better and cheaper materials available for roofing. The fact remains

that the tens of thousands of barns and houses with thatched roofs are unlikely for many years to be replaced with new roofing materials involving as they must new rafters. Rapid changes to new methods of production and construction on a large scale in the countryside would be dependent on an ample reserve of transport, labour and materials. At present none of these appear likely to be available in the near or distant future. We are more likely to see a gradual evolution and slow development of the thousands of existing small craftsman's workshops, than any



FIG. 8.—*The roof thatcher. Cleaving hazel sticks into runners for a new roof*

revolutionary change brought about by a service from the large urban industries replacing the network of small workshops.

The introduction of machinery into a small craftsman's shop must be undertaken with the utmost discrimination. Although a machine might ease the burden of a monotonous and arduous process it must earn its keep. The capital cost of it in proportion to the turnover of the business must be carefully considered. It must be remembered that the work in a small craftsman's establishment, unlike the big industrial undertaking, is not sectionalized. One or two men undertake all the processes involved in the making of an article. In consequence a costly machine

will not be in continuous use as it would be in a large factory where processes of manufacture are split up and distributed amongst numerous workers. It is essential, therefore, that the claims for a reduction of physical fatigue and the hastening of a slow manual process must be weighed with the benefits that will come from a machine process involving heavy initial capital expenditure and running costs. There is no doubt, however, that the high cost of labour at the present time is forcing certain craftsmen to install machinery in order to reduce costs of production. The proper use of machinery assists craftsmanship; its misuse will destroy the craftsman and the craft.

An outstanding characteristic of most rural craftsmen is the diversity of jobs that their skill enables them to perform. A saddler's shop is a good example of this. The basis of his craft is the cutting and stitching of leather. The range of work which his craft enables him to undertake is quite astounding. He is both maker and repairer and although there are specialists in certain branches of saddlery and travel goods, the saddler in the market-town or village undoubtedly provides an essential service to his locality. Farm harness, binder canvasses, sports and travel goods are in constant need of quick repair or renewal. Equally diverse are the activities of the smith and the wood-worker, whether he be a cart and lorry builder, wheelwright, or farm carpenter. It is this elasticity and adaptability found in a country craftsman's establishment which makes him hard to replace, and assures him of a place in our rural economy.

Some words written as long ago as 1776 by Adam Smith in his "Wealth of Nations" have a bearing on the variety of a craftsman's work. He wrote:—"a country carpenter deals in every sort of work that is made of wood: a country smith in every sort of work that is made of iron. The former is not only a carpenter, but a joiner, a cabinet-maker and even a carver in wood, as well as a wheelwright, a plough-wright, a cart and wagon builder". Even in these days of specialists, Adam Smith's words about the country craftsman are still true in principle.

So much has been said about the effect of craftsmanship on craftsmen that I hesitate to dwell for any length of time on this aspect of the subject, but it is too important to ignore. That there is an effect on the character of a man according to his work is indisputable. A creative worker who himself undertakes all the processes of making something is usually a contented and well-balanced person. The greater his attempt for perfection of workmanship the more likely is his enjoyment. Exactly why this is the case could be discussed at length, but most would agree that it is so.

The blacksmith, the basket-maker, the saddler, the potter, the thatcher, the hurdle-maker and many other country craftsmen are often solitary workers. They have developed a capacity to be alone with their work. The craftsman gains in strength both by his solitariness and his preoccupation with creative work.

Most people in these days tend to run away from such conditions and to seek employment in the large producing centres. On the other hand, a number of people have found that sectionalised work in a large factory does not satisfy them. They look for a way of life which will use their creative faculties and allow pride of craftsmanship to become one of the main-springs of their daily life. People with these inclinations may find opportunities in the thousands of small workshops

situated throughout the country districts of our land. For it is from these workshops that comes good craftsmanship, practised by men whose sane outlook on life is due to a sound estimation of values.

DISCUSSION

THE CHAIRMAN: I am sure, Ladies and Gentlemen, that you will agree with me that we have listened to a most interesting paper, and before I ask you to express your thanks to Mr. Clark, I would like to call for any questions. Mr. Clark is an expert well qualified to clear up any points you may have.

Lieut.-Colonel CART DE LA FONTAINE: It would be interesting to know whether there is any scheme by which craftsmanship is linked up with the ordinary school curriculum. For the past few years I have had to examine candidates for higher awards in architecture for two county authorities and, in several cases, have found that applicants had more natural aptitude for craftsmanship than for architecture, but had never been told of training for crafts or its possibilities.

I would also like to put in a plea for the inclusion of simple plan drawing to scale in *all* training: it not only promotes observation and analysis of buildings and their contents but is a valuable addition to training for any trade, craft or profession, because the ability to read a plan and to understand a scale drawing enters into all forms of business to-day.

Mr. CLARK: The linking of craftsmanship to the ordinary school curriculum is something which would primarily concern the Ministry of Education and the local Education Authorities. I know of some village schools where, through the initiative and enthusiasm of the schoolmaster, boys have been taught the rural crafts of the neighbourhood. The importance of craftsmanship, however, is certainly being considered more and more by Education Authorities.

I heartily agree that there is a need for a better understanding of plans and the ability to read drawings.

Mr. E. W. M. HEDDLE: Mr. Clark has suggested that the essential merit of craftsmanship lies in the manipulation by the craftsman's hands.

This is not static and is therefore best illustrated by film. Recently I had the good fortune to examine two documentary films. One of these was Belgian and related to the making of wooden sabots, while the other one obtained the reward for being the finest French documentary of 1947. It showed the craft of the "cooper" in the Auvergne district. Those large 100-litre barrels for holding the wine of the district are still made by hand and the secrets are handed down from father to son. Two days are required by one craftsman to complete the job from the selection of the spars through the rough hewing, planing, fixing with hoops, and heating to get the shape, until the ends are fitted. Throughout, the quaint customs of the men are shown, the handshake on arrival in the morning, the "break" for a glass of wine, etc., and this vivid impression remains.

I should like to make a plea for further films to be made to record some of the crafts which appear to be dying out.

Mr. CLARK: Unfortunately there is insufficient time to cover the whole field of rural crafts. We have assisted in the making of a film strip which describes the making of bricks. This film strip is one of a series which is being prepared for use in schools.

Commander C. E. NEATE: A questioner asked, just now, whether craftsmanship received adequate attention under modern education. I spent yesterday in the well-equipped wood- and metal-working shop and the art studio of the Teachers' Emergency Training College at Folkestone and they seemed to take it all very seriously.

I should like to ask Mr. Clark two questions: firstly, do the various country joiners

and cabinet makers still to be found doing good work get any special consideration as regards timber?

And, secondly, is there any move on foot to establish porcelain or china works in Cornwall to make immediate use of the local china clay?

Mr. CLARK: To the first question I would say that, considering the present shortage of timber, the country joiners and furniture-makers appear to be getting their fair share of timber. Selected fine craftsmen who are furniture-makers have been given licences by the Board of Trade which enable them to obtain reasonable supplies of hard wood for their work. These craftsmen are recommended by the Rural Industries Bureau and the Central Institute of Art and Design.

I know of no movement at present to establish porcelain or china works in Cornwall to make immediate use of the local china clay.

Lieut.-Colonel C. BARTLEY-DENNISS: I would like to ask if the disappearance of farriers and saddlers in the Army is affecting the number of farriers and saddlers in the country districts. Also, does the making of elm bowls and other articles of turnery still go on? I vaguely remember a man who plied that trade on Bucklebury Common, Newbury, some twenty-years ago and who claimed to be the only one. ■

Mr. CLARK: I do not think that the fact that there are fewer farriers and saddlers in the Army is effecting the recruitment of new entrants to the farriery and saddlery trades. Generally speaking the businesses belonging to blacksmiths and saddlers pass on to the son of the family.

The recruitment of new blood to both these trades is being helped by the Government's National Apprenticeship schemes and the Vocational Training schemes. At the Bureau's headquarters at Wimbledon we are training ex-Service men in blacksmithing, agricultural engineering, and saddlery. A total of about approximately 150 men have been placed with suitable craftsmen in the countryside after an initial six months' basic training at Wimbledon.

In reply to the second question, I would say that the turning of bowls in various kinds of wood is still practised by a number of men in this country—elm, oak, sycamore and mahogany are all used. Some of the work is of a very high standard.

Mr. E. W. AWDE: Would there be any chance of some of the subsidiary crafts practised in the towns being taken to the country? For example, Birmingham is regarded as the centre of these activities and at the present time the gun trade is liable to die out, lacking apprentices. Could this craft be transferred to the country?

Mr. CLARK: I do not think that a craft which has its roots in a certain locality can be transferred to the country just as a matter of policy. The gunsmith's craft is not a rural craft. It is found in various parts of England, usually in towns. Quite often a craft such as this is dependent on a subsidiary craft and facilities available in the district in which it grew up, and the transference to a completely new district would materially affect the proper conduct of its business.

THE CHAIRMAN: I would like now to thank Mr. Clark for his very admirably illustrated and presented paper. The slides were quite delightful and the best I have seen on this subject. They would have been still more impressive if they had been in the form of movies. Through Mr. Clark's directorship of the Rural Industries Bureau during the last six years, far greater results have been achieved in matters relating to saddlery, workshops and so on than have been achieved over a long period previously. I would like now to propose a very hearty vote of thanks to Mr. Clark for this very stimulating paper.

The vote of thanks was carried with acclamation and after a vote of thanks had been similarly accorded to the Chairman, the meeting terminated.

SYNTHETIC INSECTICIDES IN COLONIAL DEVELOPMENT

By C. B. SYMES, O.B.E.

Dominions and Colonies Section, Tuesday, May 11th, 1948

Dr. J. L. SIMONSEN, F.R.S., *Director of Research, Colonial Products Research Council, in the Chair*

THE CHAIRMAN: In the history books of our youth, we used to be told that Wellington said that the battle of Waterloo was won on the playing fields of Eton. I think there will be no question that in the last great war the battles were won in the scientific laboratories of the Allies.

We are looking forward this afternoon to hearing Mr. Symes give us some account of the application of the newer insecticides in the control of the various insect-borne diseases which are, of course, the commonplace of the tropics. As you know, he has added very greatly to our knowledge of how these insecticides should be applied.

We are fortunate in having Mr. Symes as the scientific leader of the Colonial Insecticides Committee, of which Sir Ian Heilbron is Chairman. I do not think it is fully realised in this country how very indebted we are to Sir Ian for his foresight and energy during the war years in getting used in the field these insecticides, without which we should never have been able to bring the campaigns in Burma and the Far East to a successful conclusion.

I do not think I need say any more in introducing Mr. Symes and asking him to give us his paper.

The following paper was then read:

It will be best perhaps if I confine remarks mainly to work on the new synthetic insecticides with which I have been associated in the past few years rather than attempt a review of the whole range of activities on insecticides.

As you know, insecticides vary in their mode of action on insects. Some, such as arsenic, are called "stomach" poisons because usually they must be eaten by insects in order to have a toxic effect. Others, like nicotine, kill essentially by means of their toxic fumes, and a third group, which includes pyrethrum and derris powders kill merely by contact.

The new synthetic insecticides D.D.T. (dichloro-diphenyl-trichloroethane), benzene hexachloride, chlordane (velsicol 1068, octochlor) and toxaphene and a few very new ones are all of this third group. That is they are firstly contact insecticides that, if applied in such form and manner that they touch insects, those insects are affected and many die. They are of course equally toxic if eaten by insects. They are much more potent against a long range of insects than the older insecticides, they are as far as we know not toxic to humans and domestic animals at dosages used or likely to be used against insects, and they can be manufactured in very large quantities.

Chlordane and toxaphene have been produced in the United States in the past three years but we know very little about them. Though our ignorance of the action and uses of D.D.T. and benzene hexachloride is still rather depressing they have passed their first tests and we are beginning to learn quite a lot about them.

As you probably know, D.D.T. was first produced in Switzerland by the Geigy Co. in 1939, and samples were introduced to Britain and the U.S.A. in 1942. Because of its great promise in early tests its manufacture in this country was given high priority by Sir Ian Heilbron and his insecticide panel during the

war and considerable quantities were used by the forces against malaria-carrying mosquitoes and other disease-carrying insects in the war zones.

Benzene hexachloride, the second of these synthetic insecticides was first produced by the Imperial Chemical Industries in 1942. It was not developed and produced in quantity however because the authorities concerned with production of insecticides at that time considered it wiser to concentrate on one that had already shown great promise, rather than to dissipate the relatively small effort available, on a number.

It is on D.D.T. and benzene hexachloride that we in this country and in the countries of the British Commonwealth have concentrated the small effort that could be made available during the past three years. Before D.D.T. was off the "secret" list, and whilst almost every available pound produced was being reserved for the theatres of war, the Research Department of the Colonial Office managed to procure small amounts for limited trials overseas.

It soon became obvious both from the results reported by the military authorities and from those of special studies by scientists in England and elsewhere, that D.D.T. could not be used with efficacy and economy for civilian purposes in tropical areas without further very thorough laboratory studies and field trials. Such studies and trial were initiated early in 1945, by the Research Department of the Colonial Office on the advice of Sir Ian Heilbron, Professor Simonsen, and Sir W. Robinson. The work is now being conducted under the direction of a committee under the chairmanship of Sir Ian Heilbron.

BRITISH GUIANA: MALARIA

We made a start with the application of D.D.T. for the control of malaria in British Guiana. Malaria as you know is caused by a blood parasite that is transmitted from man to man by certain kinds of mosquitoes. It is a scourge all over the tropical colonies and, in my opinion, it is undoubtedly the greatest obstacle to the economic, social and political development of the millions of backward peoples in Africa, the West Indies, India and the Far East.

Up to the last few years measures for its suppression had consisted of drainage of swamps and water courses, weekly oiling of water that could not be got rid of, or made to run fast, large-scale bunding, and spraying of houses with pyrethrum solutions—all very laborious and costly, and applicable generally only to towns and cities, rather than to rural areas, because of their cost in money and effort. Though we had accomplished a very great deal by such measures over many years, we had only scratched the surface of the problem and there seemed to be little hope that in any reasonable period of time we should be able to consider seriously the control of the disease in the large rural populations of the tropics.

British Guiana was chosen as our first experimental ground for various reasons, not the least being the very high incidence of malaria in its population. As you probably know British Guiana is a big country with a small population of about 370,000, most of whom live in a narrow belt along the coast. This coast belt is very low lying, much of it being below sea level. It is protected from inundation by sea walls, miles of canals, and drainage ditches, and a series of pumping stations. In addition to the purely drainage canals, many others bring in fresh water from

extensive catchment areas a few miles inland. This fresh water provides for the domestic needs of the population and serves to irrigate the sugar plantations that occupy most of the coast belt.

Dwellings usually built of wood on piles, are almost invariably approached by narrow plank bridges over ditches and canals. There are large areas of permanent and semi-permanent swamps and these are augmented by the water-fallowing that is a necessary part of the routine rotation of cane fields. British Guiana is definitely wet underfoot: the cattle seem to have become semi-aquatic and often graze up to their very eyes in water. Rainfall is fairly heavy at about 100 ins. a year and temperature, and humidity are high, the latter being rarely below 70 per cent.

Such conditions are ideal for the production of a variety of mosquitoes in very large numbers. They make life very uncomfortable and definitely precarious except



FIG. 1.—*British Guiana. Native lines or ranges*

in Georgetown, where effective control has been established by the co-operation of the Government health services and the Rockefeller Foundation. You will appreciate the density of this mosquito population from the fact that in our daily early morning catches we frequently found 700-800 mosquitoes in one small bedroom, and in one particular bedroom of Lodge village just outside Georgetown we obtained over 1,400 in one catch. The proportion of these that were carriers or potential carriers of malaria varied with the district. On one sugar estate, one of our sampling rooms often yielded several hundred females of *Anopheles darlingi*, the species of mosquito responsible for practically all, if not all, the malaria in British Guiana. Amongst others that were always present were *Culex fatigans*, carriers of filariasis—a disease caused by a tiny worm, that often develops into that hideous and crippling condition called elephantiasis—and *Aedes aegypti*, potential carrier of yellow fever. We had adequate mosquito material for our trials.

Since we knew very little about applications of D.D.T. and their possible effect

on mosquitoes we decided to start a study of the action of a simple 5 per cent. solution in kerosene.

For this purpose, we selected two sugar estates, both with a very high incidence of malaria, and a small area of peasant farms equally heavily infested.

Certain barrack blocks of the wooden labour lines of the first estate were selected for treatment, and other portions for "control" observations, in such a way that treated and untreated blocks alternated.

Preliminary surveys were made of the occupants of each quarter, of the mosquitoes found in their rooms and of the amount of malaria they had, and of the amount of mosquito breeding going on in the surrounding canals and drains. We then sprayed inside surfaces of alternate barrack blocks with the 5 per cent. D.D.T. solution (at a dosage of about 100 mgms. per sq. ft.) in order to leave a deposit of the insecticide on walls and ceilings so that mosquitoes entering and settling on them as they usually do before or after biting the occupants, would stand on some of the small crystals of insecticide and so become affected by their toxic properties. We hoped to be able to judge the effect on mosquitoes by comparing the numbers in huts after treatment with those in the same huts before treatment, and also with numbers found in the neighbouring untreated huts.

Briefly our mosquito captures in treated huts over six weeks after spraying dropped to less than 3 per cent. of the numbers we caught before spraying and as compared with the numbers we continued to capture in untreated huts. And for over ten months after the single spraying they were still down to less than 8 per cent. of the numbers in untreated huts. And it was pleasing to find that the numbers of the malaria mosquito (*A. darlingi*) were down to less than 2 per cent. of pre-treatment numbers.

On the second estate we sprayed all the barrack blocks, not leaving alternate ones unsprayed, as in the first experiment. Results were similar. There was a total mosquito reduction to less than 4 per cent. and a reduction of the malaria mosquito to less than 2 per cent. over ten months. I should make it clear that we made only *one* application of insecticide. These results were gratifying, but we were aiming at malaria through a reduction of mosquitoes, and it remained to ascertain what effect this reduction had on the incidence of this disease.

Before the treatment over 55 per cent. of children on the first estate had malaria parasites in their blood and over 40 per cent. on the second estate. We were unable to remain long enough in British Guiana to see the effects on malaria, but Dr. Giglioli, who continued the work, has reported that on the second estate malaria infection had dropped by about 50 per cent. five months after our treatment. (The first was treated in such a way that the effect on malaria was not likely to be very clear.)

No clinical cases of malaria were observed for 21 weeks. First actual cases of malaria occurred in December (that is about eight months after the spraying). Five months after the spraying the spleen rate had fallen from 70 to 44 and the malaria parasite rate from 42 to 20. That is there was a reduction of about 50 per cent. in the numbers of people infected in five months.

I should perhaps repeat that these results were the effect of one application only.

of 5 per cent. D.D.T. solution in kerosene on the wooden walls and ceilings of houses.

Our object in the third experimental area which I mentioned was not to see the effect on malaria but rather to watch the effect on mosquitoes of a variety of different solutions and emulsions applied to different surfaces. For here amongst our experimental houses were some made of mud and poles.

Perhaps our most important observation here was the rapid loss of action of the solutions we applied to mud walls and this we suspected was due to absorption of the solution by the dried mud.

Of some of the later work conducted in British Guiana on similar lines, Dr. Giglioli gives us the following information:—

(1) Up to June, 1947, out of a total colony population of 375,000, 115,000 are enjoying total and 74,000 partial benefits of D.D.T. protection.

(2) The Yellow Fever and malaria control organisations have been merged into one.

(3) In Lodge Village where over 60 per cent. of school children showed chronic infection by malaria in 1945, only 14 per cent. are now infected, the number of births in 1947 was three times as great as in the years preceding application of D.D.T., and infant death rate per 100 live births dropped from 333 to 67.

Dr. Giglioli says "It is difficult even to estimate the benefit that will accrue to this colony if malaria can be brought under control as effectively as all the evidence at present before us leads us to expect".

BRITISH GUIANA: YELLOW FEVER

An experiment was carried out by the British Guiana Yellow Fever Control Service (a co-operative effort by the Rockefeller Foundation and the Government of British Guiana.) By the expenditure of very large sums of money on the upkeep of an organisation for the weekly inspection of all houses, buildings and compounds in Georgetown, the numbers of *Aedes aegypti*, the urban mosquito vector of Yellow Fever, which breeds in drums, tins and other "domestic" containers, had been reduced almost to nil. Maintenance of such a service and its necessary expansion to other towns and villages was very expensive. A trial was therefore made of house spraying for the control of the yellow fever mosquito, as we had conducted it against the malaria mosquito. It was found that one application of 5 per cent. D.D.T. solution in kerosene reduced both the adult and young forms of the Yellow Fever vectors as satisfactorily as the old method of inspection, in much less time at much lower cost.

The Yellow Fever Service is now relying almost entirely on D.D.T. applications for Yellow Fever control in towns, and at seaports, and airports. In practice both yellow fever and malaria mosquitoes are dealt with by one house-spraying operation.

It seems probable, however, from Dr. Giglioli's recent work that the one operation will not suffice to check filariasis and elephantiasis as well as the other two infections for though the main carrier of filariasis (*Anopheles darlingi*) is adequately dealt with, the other (*Culex fatigans*) is more resistant to the simple D.D.T.-kerosene solution

so far tried. But more research will probably produce a preparation that will solve his problem too.

AFRICA: MALARIA

From British Guiana activities were transferred to East Africa, where we set up our headquarters and laboratories at Entebbe and Kampala.

Experiences in British Guiana indicated the need for a much more intensive study of the new insecticides. To permit this our team was enlarged and equipped to undertake the necessary chemical work as well as more extensive field trials.

Conditions in East Africa are very different from those of British Guiana. There is only about half as much rain and correspondingly lower humidities, the country is very different topographically and though there are extensive swamps, generally speaking, drainage is good without the help of thousands of miles of canals and



FIG. 2.—*Tsetse. East Africa. Infested lake shore vegetation*

ditches. The mosquitoes are of course of different species and the two malaria carriers—*A. gambiae* and *A. funestus*, though they enter houses, are not so domesticated as *A. darlingi* of British Guiana. The first of these however—*A. gambiae*—breeds in stagnant open water much as *A. darlingi* does, and because of its adaptability to a considerable variety of conditions it is almost certainly the world's best (or worst) malaria vector. Then, of course, the people are very different in habits, and most important, most of them live in houses with dried mud walls and thatched roofs.

Work against malaria was continued on the lines initiated in British Guiana—applications of insecticide preparations to the inner surfaces of dwellings.

In our first large trial, conducted in co-operation with Drs. D. and M. Bagster Wilson, we sprayed with a 5 per cent. solution of D.D.T. in diesoline about 1,500 native huts in the Jinja district of Uganda. Dosage was at the rate of 200 mgms. of D.D.T. per sq. ft. Applications were made four times over about 18 months, the effect on mosquitoes in the houses and on malaria in the population was observed.

Though mosquito captures in the treated area were reduced by from 60 to 70 per cent., the effect on malaria appears to have been negligible. This cannot be explained at the moment.

In another large field trial of the same treatment we have been associated, though not as actively as we had wished, with Dr. P. C. Garnham in an experiment to control the very seasonal malaria which seriously affects the labour on tea estates as well as the general rural population in the high Kericho district of Kenya. Conditions are of course very different from those existing in the much lower and warmer Jinja area of Uganda. The people living in the experimental area are essentially cattle people, independent and very touchy. Their huts, though of mud and poles, have a first floor on which are stored all foodstuffs (grains and millets mostly) and farm implements.

Mosquitoes responsible for the malaria are essentially of the same species as those at Jinja (*A. gambiae* and *A. funestus*) but because of the altitude (6,000 ft.) and the lower temperatures they appear in appreciable numbers usually only during a short season in April, May and June and then in relatively small numbers.

The amount of insecticide applied to the internal surfaces of huts (in the form of a 5 per cent. solution in power kerosene) was again about twice as much as we had applied in British Guiana. It was put on four times over a period of a year.

Results on malaria after the first spraying were as you see in the table.

Fig. 7A
KERICHO (KENYA)
Malaria parasite rates 1st season's results

	In treated area		In untreated area	
	Before treatment and before epidemic	After	Before epidemic	After
<i>Parasite rates :</i>				
General	7 %	16 %	8 %	36 %
<i>P. falciparum</i> ..	6 %	16 %	7 %	35 %
Spraying of houses reduced malaria epidemic figure by about 50 %				

There was apparently an appreciable reduction of infection during this first wet season. The second season's results on malaria are somewhat similar. The treated area gave a parasite rate of 6 per cent. and 3 per cent. in May and August, 1947, and the untreated area a 9 per cent. rate in both months. Unfortunately for the work there was no epidemic.

A third trial of rather a different kind was undertaken in the rural areas to the

north of Entebbe in Uganda. Here we used six neighbouring districts for trials of six different treatments and a seventh district was observed as a control. The areas treated contained about 2,200 houses and a population of about 5,500. Three of these were treated with preparations of benzene hexachloride and three with D.D.T. Exact surveys were made, as before, of people, houses and rooms, mosquitoes and malaria incidence before the applications were made, and intensive observations were continued on mosquitoes and malaria over two wet seasons (that is about 16 months). During this time three complete applications were given to houses in the six experimental areas.

The effects on daily captures of house mosquitoes varied with the treatment somewhat but they were quite striking as you see from the next three charts.

Effects on malaria varied much more. Simple solutions of D.D.T. in diesoline, though they seemed to check the seasonal rise of malaria, caused no apparent fall in the numbers of people infected. The benzene hexachloride, however, applied both as a solution in diesoline and as a powder suspended in water, appears to have resulted in quite a striking reduction of about 50 per cent. in the numbers of infected people during both wet seasons.

Fig. 11D

KASENJI (UGANDA)

Effects of different treatments (spraying) on malaria parasite rates

	Sabadu (control) No treatment	Mumyuka 5% D.D.T. in diesoline	Sabawali 5% B.C.H. in diesoline	Matuba II 5% B.C.H. powder in water	Matuba III 5% D.D.T. in Ker. and C.S.O.	Musale 5% D.D.T. in diesoline (walls only)	Sabagabo 5% D.D.T. in diesoline (roofs only)
Before spraying (May, 1946)	20.1	30	35	54	51	35	27
3 months after 1st spraying (Aug., 1947)	29.8	27.7	22.9	25.4	49.4	32.5	44.3
2½ months after 2nd spraying (Jan., 1947)	36.6	37.5	32	34.4	48.9	37.6	33.3
2 months after 3rd spraying (June, 1947)	42.1	30	23.3	28.6	35	40.8	31.4
Approx. costs per house; 3 applications		8s. 4d.	7s. 6d.	8s. 3d.	11s. 0d.	6s. 7d.	6s. 0d.

We are being cautious about these figures. They are inadequate for basing definite conclusions. We are conducting further intensive surveys to supplement them in an assessment of results up to date. I feel however that the data we have warrant a little optimism.

As an essential part of all these trials very large numbers of laboratory tests and estimations, and special studies were conducted which helped us to understand a little of what was happening in our field experiments.

Some of these studies showed that the dried mud walls and thatch of native houses absorb very large proportions of solutions and emulsions of the insecticides but considerably less of powders in suspension in water. When this absorption takes place only a very small proportion, perhaps 10-15 per cent. of the total insecticide applied, remains available on the surfaces to make contact with alighting mosquitoes. We found too that solutions and emulsions applied to lime-washed and



FIG. 3.—*British Guiana. View of canal with labour ranges or blocks*

“distempered” walls of the better class African or European houses were absorbed in similar fashion. Powders of certain particle shapes and size in suspension in water, are not so readily absorbed into the tiny air spaces of dried mud and plaster, and so remain on the surface in greater proportion than the solutions. This absorption probably explains to a great extent the poor results of the treatments in Jinja and it probably helps to explain similar results from the use of simple kerosene solutions in West Africa

It is obviously necessary to make further studies of powders of various sizes and shapes to find those that will resist absorption by the mud and plasters of many different textures used for houses, walls and wall finishes in Africa and elsewhere.

AFRICA: TSETSE-FLIES. (1) SPRAYING OF BUSH

Our second main activity in Africa was a trial of these same insecticides against tsetse flies. These flies, as many of you know, inhabit bush of a variety of types

and densities over thousands of square miles of East, Central, West and South Africa. They live by sucking the blood of animals, including man and his cattle where these are convenient, and in this way they convey blood parasites that cause sleeping sickness in man and a similar condition (known in South Africa as "Nagana") in cattle. Next to malaria they are undoubtedly the greatest economic problem of Africa.

There are 21 species of these flies, all with specific differences in their habits; but three things they have in common—they breed in the soil, the adult flies when not in flight sit about, on, and under leaves, stems and tree-trunks, and on the ground, and they alight on animals and on man to feed. There appeared to be two obvious ways in which to try contact insecticides—first to spray the bush so that as much surface as possible of leaves and stems and of the ground should be covered



FIG. 4.—Uganda. Type of native hut and staff

with a lethal deposit, and to spray cattle so that flies alighting on them to feed would make contact with the insecticide on hides and skin.

We have concentrated on the former up to now, whilst the Tsetse Research Department of Tanganyika have done certain trials with the latter method.

For the treatment of bush we selected certain small infested islands and headlands on Lake Victoria cut the necessary fly paths through the bush and made estimates of the densities of their tsetses by the usual hand captures. Then with the small portable knapsack sprayers that were used for house-spraying, insecticide solution was sprayed on to the vegetation to a height of about six feet at places that had shown high concentrations of flies during initial surveys.

Five field experiments were conducted in this fashion. In the first two, which involved single applications of D.D.T. and benzene hexachloride each in kerosene and cotton seed oil, there was a drop in flies of 50 per cent. and 80 per cent. respectively during the week following the applications; then flies began to increase again. A third trial of the same kind in which benzene hexachloride solution was

applied over about 4 per cent. instead of 2 per cent. of the total vegetation, reduced flies by about 80 per cent. over some eight days after the spraying. Then they began to increase.

Laboratory estimations and studies conducted side by side with the field trials had by this time indicated that the insecticide solutions we were using, began to lose their toxicities in eight to ten days after the application to trees and shrubs, because much of the oil solution was being absorbed by their leaves and stems. It also seemed that there was an additional loss of toxicity through the prolonged action of sunlight, either because of the high temperatures or of the action of certain ranges of light-rays or of both.

In the next two field trials attempts were made to overcome this rapid loss by making four applications over a period of about 55 days. This is approximately the period during which the larvæ of flies we were concerned with (*G. palpalis*), newly deposited in the soil, can complete their development into active adults.

We were still treating only a very small percentage (not more than about 6 per cent.) of the total infested vegetation.

Results in both trials were a reduction of flies by over 96 per cent. In one of these trials in fact we could not find a fly for over nine weeks after the last application of insecticide.

These trials with their accompanying laboratory studies, indicated fairly clearly that both D.D.T. and benzene hexachloride are lethal to tsetses and might well provide a method of elimination if we can apply them in such a way that they retain their toxicities on a large proportion of the vegetation for several weeks, preferably months. Studies are continuing with this aim in view. But there are important preliminaries to be solved on the way to the main solution. As you know not all leaves and stems of plants have the same external features and textures. Some are hard and waxy; others soft and hairy. Some solutions stick well to one type, some to the other. Absorption of solutions by plants varies with types of leaf and stem surfaces. Again, some leaves have such long hairs that tsetses alighting on them rarely touch the leaf surface proper but only stand on the hairs. How soon we shall overcome these and other factors that influence results will depend largely upon the scale of effort that can be devoted to this work.

For the treatment of a bigger proportion of vegetation than can be reached by ordinary ground sprayers, preliminary trials have been made with smokes produced by grenades and canisters containing one or other of these insecticides. From both D.D.T. and benzene hexachloride we obtained kills of tsetses where the smokes got at them. But the kill was not complete because of inadequate spread through the bush, and the smokes were too light to leave insecticidal deposits on the vegetation through which they drifted. Escaping flies were therefore able to continue to breed and rebuild the fly population.

We are hoping to use aircraft experimentally this year for applications of insecticides to infested bush. It was thought not desirable to do this until we had made extensive ground studies. The South African authorities, as you may know, have conducted large-scale trials with aircraft over about 170 sq. miles of tsetse bush; by means of smoke containing D.D.T. emitted through the aircraft exhaust pipes they have apparently reduced tsetses almost to nil. A few remain in dense

evergreen bush of water courses and it is hoped that these will be dealt with by the use of smoke from generators distributed by hand. It is always the last two or three flies that present the greatest difficulty. Insecticide smokes produced by burning grenades and canisters and through exhausts are of course wasteful, in that as much as 50 per cent. of the insecticide used may be rendered valueless by the high temperatures at which they are produced.

(ii) SPRAYING OF CATTLE

The second obvious method of attacking tsetse—that is by spraying cattle with insecticide so that they serve as a poison bait to flies settling on them to feed—has been studied by the Tsetse Research Department of Tanganyika and in a much smaller way by our team in Uganda. Preliminary work by the Tsetse Department



FIG. 5.—*British Guiana. Closer view of ranges or blocks*

indicated that oil solutions of D.D.T. (with 9 per cent. resin) when sprayed on to cattle (at a dosage of about 450 mgms. per sq. ft. of hide) lost their toxicities after four or five days, whereas similar solutions sprayed on to dried hides remained highly toxic to tsetse for several months. This again we found was mostly due to absorption through the skin of the living cattle. Our chemist has found traces of insecticide in the blood and urine of cattle so sprayed and it is suspected that certain of the organs may retain it for a time at least.

In spite of this difficulty it was considered advisable by the Tsetse Research Department to try the method in a fairly large field experiment against (*G. pallidipes*) a species of tsetse that occupies more country to the exclusion of man and his cattle in East Africa than perhaps any other. Three hundred and forty cattle were sprayed (with a 9 per cent. D.D.T. solution in monkey-nut oil plus resin) once a week for 13 weeks and then twice a week for eight weeks. During that period they grazed daily for ten hours in small groups of five or six animals, tended by herd-boys,

equally spaced over five square miles of an isolated block of tsetse-infested bush. The reduction of tsetse as the result of this was approximately 71 per cent. in the first 13 weeks and 81 per cent. in the following eight weeks.

The obvious line of work arising out of this is a search for insecticide preparations that will not be absorbed, but that will stick to hide and hairs of cattle under exposed conditions in tsetse areas for at least several weeks.

This problem of absorption of insecticides by cattle and by plants is of course one that interests many people concerned with food production and human and animal health. We have yet to ascertain what effects, if any, these absorbed insecticides have on cattle, over a prolonged period, and what effects if any, they may have on people who may ingest minute amounts with butter and milk and other animal fats, or on uncooked vegetables.



FIG. 6.—*Tsetse. East Africa. Spraying bush with small motor sprayer*

(iii) OTHER WORK

There is no time left to make more than a brief mention of the successful work by Dr. Garnham and Mr. McMahon in Kenya on the control of *Simulium* flies and the blinding worm infections that they transmit, with D.D.T. emulsion applied to streams; of the good results obtained by Mr. Hocking in Uganda and Mr. Jepson in Tanganyika and by others in Nyasaland with benzene hexachloride for killing the ticks that carry relapsing fever; and of the preliminary successes obtained by veterinary scientists in various countries with D.D.T. and benzene hexachloride preparations for controlling the many cattle ticks that transmit devastating diseases to cattle. These and other problems of great magnitude are receiving what attention it is possible for the small numbers of scientists to devote to them.

SPECIAL EQUIPMENT NEEDED

Another matter of the greatest importance to which I may make only the briefest reference, is the provision of equipment for applications of these new insecticides. At present we are obliged to make use of a variety of sprayers designed for other

purposes. Many of them are quite unsuitable for the forms of work for which they are now needed. A special study of the basic principles of spraying and nozzle design is therefore being carried out, as an essential part of our programme, with a view to the production of equipment designed for this specific purpose.

I have perhaps mentioned enough of this work and of its trends to enable you to form some opinion of the probable first important contributions of these new insecticides to a proper development of the tropics and sub-tropics, if we can learn how to apply them intelligently and economically.

Equally great I think will be their influence on pests of crops and stored products when suitable methods of application have been worked out.

It will be no easy matter, even when we have learned how to use our preparations with good effect, to get them applied on an adequate scale and with adequate speed to major problems. Not only must millions of native peoples, deprived of a large proportion of their energies and of their products, and ousted from millions of acres of fertile lands by tsetse flies and by insect-borne diseases and pests, be given full vigour and land on which to exercise it, but this must be done quickly if they are to contribute reasonably to their own economic, social and political advancement, and help fill the serious deficiencies in world food supplies.

I am one of perhaps a few people who consider that insecticides can be made to contribute more to this task in shorter time and at less cost than perhaps any other method if we can devote sufficient effort to it now.

DISCUSSION

THE CHAIRMAN: I think you have already shown by your applause how greatly you appreciate the brilliant lecture which we have just heard from Mr. Symes. He has shown that by the use of these newer insecticides it should be possible to control that major disease of the tropics, namely, malaria, and so overcome the concomitant lethargy of the population who suffer from that disease. We have, I think, the tool to control malaria, but it is quite obvious that we do not yet know the best way in which we can use this tool. The method of use must vary with the particular type of mosquito to which it has to be applied. For instance, there is the very great success which has been met with in British Guiana, where the mosquito is a domestic animal and lives in the house, as compared with the less domesticated mosquitoes of East Africa.

But the problem of the tsetse fly is very much more difficult. I had the opportunity, in 1946, I think it was, of seeing the country in which Mr. Symes was attacking this problem, and I saw the density of the bush which had to be sprayed or treated in some way with an insecticide. I do not profess to have any particular knowledge of this subject, but it did occur to me that there was not much prospect of success simply by using a spray, and that very probably some form of smoke, probably from an aircraft of one sort or another, either helicopter or winged aircraft, might provide the solution. It is a problem of very great complexity and one which, unfortunately, is not yet being attacked on a big enough scale.

There is a definite shortage—I am sure Mr. Symes will agree with me here—of the necessary technical staff to carry out this work. We are doing it at the present time with about four scientists on the research staff of the Colonial Insecticides Committee, and from the slides that have been shown you have seen the area of that mass of land which has to be attacked. The problems are large, the staff is small, but for the future of Africa, as Mr. Symes has already told us, the problem is of outstanding importance.

The South African experiments hold out very great promise of success, but one has to remember that they are working in an area to which the tsetse fly cannot return. It is really an island area, Zululand and Swaziland, to which the tsetse fly, if once eliminated,

cannot return; whereas in the East African Colonies and West Africa the only prospect presumably is to clear the tsetse by spraying the land and then to populate as rapidly as possible. You might then be able to hold the land clear.

I am sure there must be others present who can speak with much greater personal knowledge than I can. I would like to express my own personal pleasure in the paper to which we have listened.

Lieut.-Colonel L. J. BARLEY: I should like to add my thanks to Mr. Symes for the most interesting paper which he has read. I have been in touch with him from time to time and have been impressed throughout by his scientific approach to these problems. Some of the obvious solutions, where there might be a loophole, had first to be covered by the laboratory and small-scale work. It is only in that way that we can arrive at the right solutions.

I would like to ask Mr. Symes whether, with regard to the tsetse fly, there is really, in fact, any hope, so far as the central body of Africa is concerned, of eliminating the fly on any vast scale. It seems to me that even if one could apply many squadrons of aircraft the whole time, the whole thing would have to be organised like an army campaign, and it would cost a very great deal, unless we could get down to some method, perhaps such as Mr. Symes proposed, by generation of these insecticides by simple technique on the ground.

Lieut.-General Sir BENNETT HANCE: I should like to ask Mr. Symes what is the likely effect on the balance of nature, on pollinating insects, of this generalised spraying of bush and jungle. I wonder whether that has been considered—I am sure it has; but I do not think Mr. Symes referred to it in his lecture. A couple of years ago in the T.V.A. they were very exercised in their minds about the possible effect of the wholesale spraying of the landscape with D.D.T. I am sure Mr. Symes must have given that his consideration.

Mr. C. B. SYMES: May I say to Colonel Barley that we do feel quite optimistic about controlling tsetses, although at this stage perhaps not of eliminating them from the whole body of Africa, for that would, I think, be a most unjustified optimism; but we do feel that if we can carry on with this sort of work with sufficient energy, we should be able to make use of these insecticides in such a way that we can eradicate tsetses from limited areas. One would not think, of course, at this stage of tackling 1,000 square miles of bush, but one might think of say ten or 20 square miles. I agree with him that to think now at this stage of squadrons of aircraft dropping smoke or some other form of insecticide over thousands of square miles is a little bit "tall", but 30 years ago, of course, we could not visualise seeing 1,000 aircraft in the air. Now, 30 years later, that has been a common sight. These things develop.

I think smokes are promising if we can put them where we want them, and that is what we are hoping to try out in the next few months.

With regard to the balance of nature, we have thought about it a very great deal, and it is the fear that these things might upset the balance of nature that has held back the agriculturists generally from adopting these synthetic insecticides for much greater general use, certainly in Africa. But for tsetse work, we do not feel very worried about that matter, because most of the country in which we are experimenting and in which we propose to experiment is completely unoccupied. It has no crops, it is quite useless, and it is given over entirely to tsetse fly. We therefore think that we could not do very much damage at the moment. But we have given very considerable thought to this, and we are proposing to carry out a study of the effects of these insecticides applied in excessive doses to this type of country. That study, I think, will be carried out in the near future.

A vote of thanks to the author of the paper was then proposed by the Chairman and was carried with acclamation.

Dr. J. W. P. HARKNESS: It is a great pleasure to me to propose a vote of thanks to

our Chairman, Professor Simonsen. In doing so, I should like to be permitted to say, first, a word of thanks and congratulations to Mr. Symes for his address to-day.

I have had some experience of practical results from these experiments in British Guiana, which I recently visited, and I can assure you that, had the original experiments in the use of D.D.T. not been started in British Guiana, there would not have been much progress in the battle against malaria. The previous methods of control were simple enough in theory, but the reduction of malaria by therapeutic measures was completely impossible in that country, and as was pointed out to me in British Guiana, to control it by oiling the canals of the coastline where most of the population live, would have been a sheer impossibility because of the magnitude of the task. In one square mile of sugar plantations there are 65 miles of irrigation canals, drainage trenches and drains to control. Without D.D.T. and the careful work done by Mr. Symes with the local people, there would have been no practical hope of any rapid advance in the control of malaria in British Guiana at a reasonable cost.

It now becomes a comparatively cheap and inexpensive method of eradicating malaria from these coastlines. The cost works out at between two and three dollars a year per house. The reduction of *Anopheles darlingi*, the malaria vector, in the treated areas has been so great that it has been possible to extend the period between re-spraying to one year. By the end of 1948 it is planned to have the whole of this coastal population under protection from malaria by this method of control.

All this valuable work which is now being done arises out of the very careful and meticulously controlled experiments for which Mr. Symes was originally responsible. It has been a great pleasure to me to hear him speaking on the work that has been done in Africa.

But I must ask you to think of our Chairman. The work of investigators such as Mr. Symes and his colleagues has always been very difficult. They could never get means and manpower. It was because of the energy and enthusiasm of persons like the Chairman of the Insecticides Research Committee that the grist was found for the mill. The war gave some impetus. Professor Simonsen was one of those who had the vision and foresight to press for the practical application in the field of the theoretical research work. A great tribute should be paid to Dr. Simonsen and his colleagues for moving the mountain of bureaucracy in the right direction so that the people who live in the Colonies might eventually benefit.

I ask you to accord a hearty vote of thanks to our Chairman, Dr. Simonsen.

The vote of thanks was carried with acclamation, and the meeting then terminated.

R.D.I.s AND THE HOME

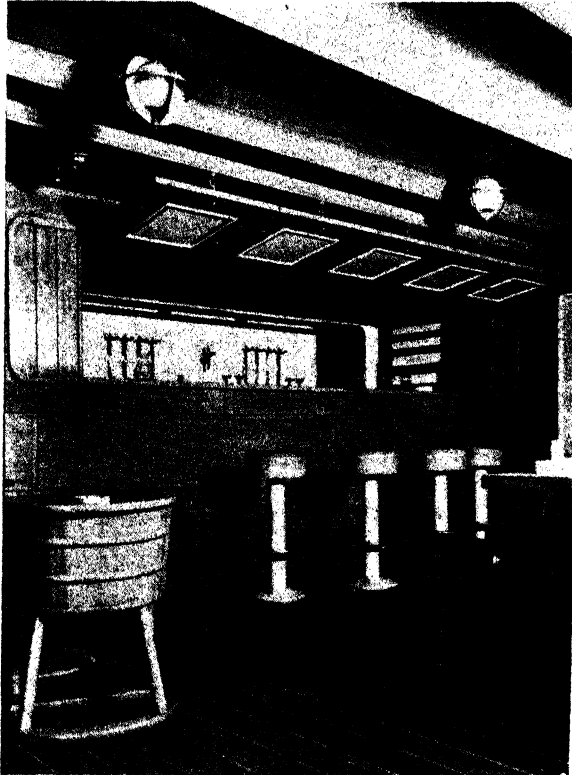
The following is a short note showing the contribution made by some of the R.D.I.s towards design for various articles for use in the home.

Sir Ambrose Heal, the builder of a great business founded in 1810, is designated usually as a Designer of Furniture, but he is eminently more than this. For over 50 years he has been a member of the firm of Heal & Son, Ltd., of London, and for over 35 years its Chairman; and his great influence through these years cannot be measured only in the sphere of furniture. It is fitting that his name be mentioned first in this note, because he, recognising the talent of many other designers of to-day, has supported them by showing their work and by selling their products in his shop. The whole space allowed for this article could be filled telling the story of his work.

Gordon Russell, the present Master of the Faculty of Royal Designers for Industry, has also a claim to fame, in the first place, for his work as a maker of fine furniture. He has produced his own work; and also extended his individual ideas

to include a shop to sell beautiful things for the home. And also through the war years he played a leading part in the Board of Trade schemes for Utility furniture and he is now the Director of the Council of Industrial Design which has already benefited by his wise counsel and clear thinking. Gordon Russell has already left the mark of his genius on his generation.

Next, I come to the name of his already distinguished younger brother, R. D. Russell, trained in the same school as Gordon Russell at Broadway, and now a Professor in the Design School at the recently reconstituted Royal College of Art.



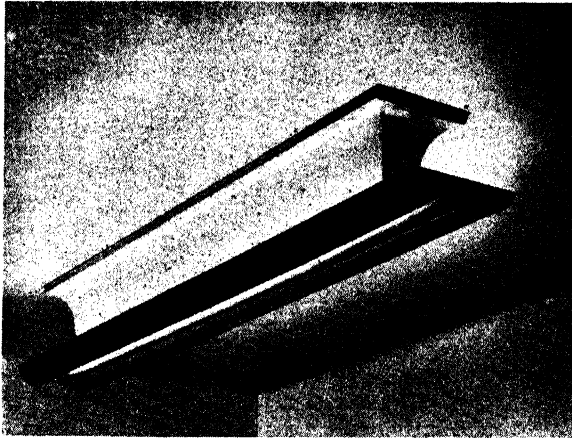
The Tavern in S.S. "Orion" of the Orient Line, designed by Brian O'Rorke, R.D.I. in 1935.

These three craftsmen have all been designers and makers of fine furniture, outstanding in their generation, and it is to be recorded with gratitude that they are still with us and active in all that contributes to a better way of life.

We come now to the name of Brian O'Rorke, who has already made an important contribution to good design in many spheres. He is still young enough to have an even greater part to play when the difficulties, that beset those who have talent and enterprise, may have been removed.

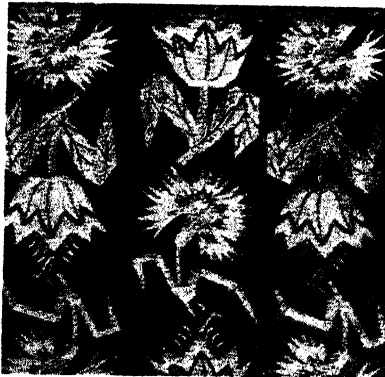
The name of A. B. Read is also honoured in the company. His work in the sphere of lighting is of the very best. He is active in many ways; his long association with the Design and Industries Association and other kindred movements has

meant strength to them because of his considered and balanced judgment in all matters relating to design. He is also one of the examiners for the Ministry of Education relating to Art Schools and the National Diploma. A. B. Read's work has surely been "a light in the darkness".



Fluorescent lighting fitting, designed by A. B. Read, R.D.I., A.R.C.A., F.S.I.A., for Troughton & Young (Lighting) Limited. It employs indirect lighting by two 5-ft. tubes and all the metal work is stove-enamelled.

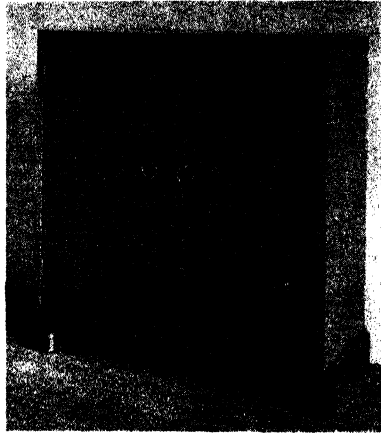
The Pottery and Glass Industry is represented by such distinguished men and women as Keith Murray and Susie Cooper. Keith Murray is an architect and his work, the creation of the new Josiah Wedgwood Works at Barlaston, will ever be a monument to his genius; but his designs for pottery and glass have also made



Utility furnishing fabric, "Flora", woven in two colours, designed by Enid Marx, R.D.I.

their mark. He has also designed silver, and he was well represented in The Royal Academy Exhibition of Art in Industry in 1935 in all three of these industries. His best-known work, however, remains the pottery, designed by him, produced by Josiah Wedgwood & Sons, Ltd., and well known as Keith Murray ware.

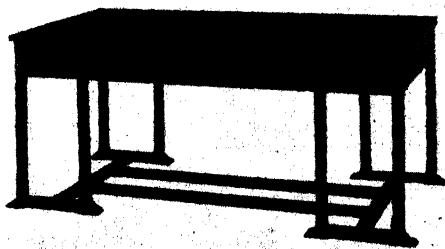
Susie Cooper well deserves the honour conferred upon her as the first woman potter in England. Her work is of a character and charm which has made a very definite impression on women shoppers in this country as well as in other parts of the world. This appeal is unique and it is evident by examples of her work seen at



*Cupboard in mahogany, designed by Gordon Russell and
manufactured by Gordon Russell Limited in 1928*

recent exhibitions that she has lost nothing of her skill, and her productions are even improving and are of outstanding merit. It is difficult to appraise the work of such an artist, whose name in England and overseas is already well known, without appearing extravagant.

Before the war, when enterprising men and women were more or less free to give full expression to their gifts, Great Britain held a prominent place where the design



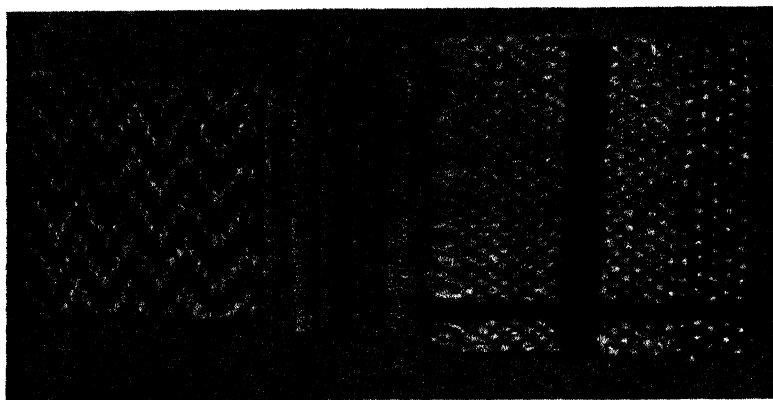
*Walnut writing table designed by Sir Amrbose Heal,
R.D.I., for Heal & Son, in the late 'twenties*

and manufacture of fabrics were concerned. We look back on the achievement of those days with pride and with a sense of loss when we compare yesterday with to-day. To detail the individual work of the various designers would take too much space, but reference must be made to Allan Walton, who created a business and

built up a name for fabrics, beautiful in themselves and of fine quality. The people who went shopping knew it was a certain guide to superb quality if they asked for an Allan Walton production. Having given of his talents and created a definite style, he now holds a Professorship in Fabric Design in the directorate of the Royal College of Art and thus are we assured that his sphere of influence is widened for the future.

Ethel Mairet may well be termed the patron saint of artist-weavers. For many years her beautiful weaving has given satisfaction to those who love beauty in all its forms. Her work is as well known as her name and her colour sense is unsurpassed. She is a master and knows all that is essential for a fine piece of weaving from beginning to end.

Anna Zinkeisen is the exponent of loveliness, and when beauty in design and



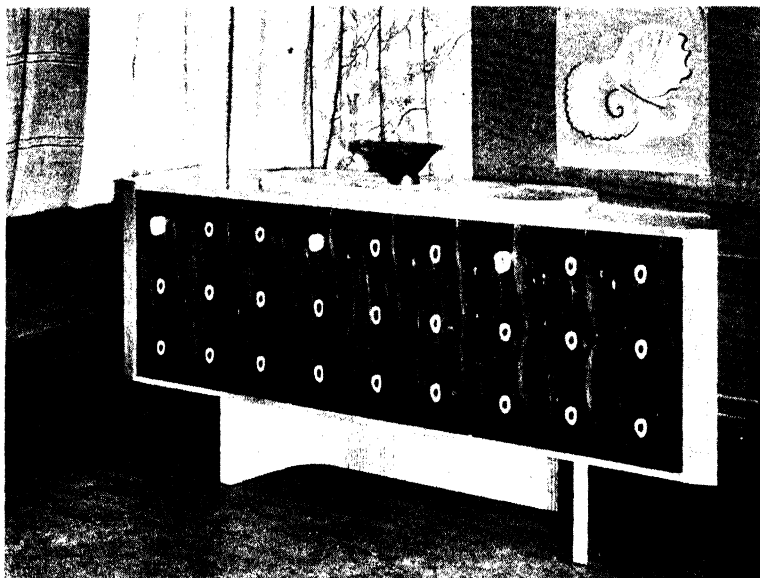
Woven textiles by Ethel Mairet, R.D.I., 1937

colour in fabrics and murals present themselves to the mind, her genius is recalled. Her name is associated with charm and with the joy of living.

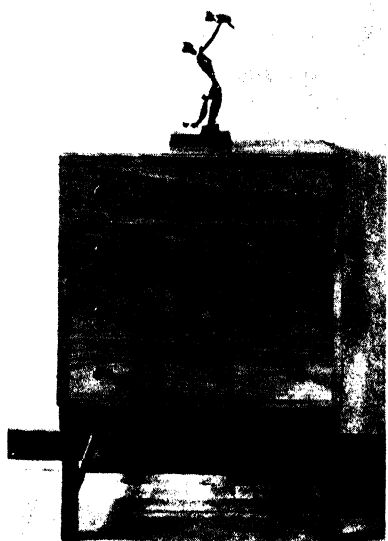
With Duncan Grant and Enid Marx, who created new trends of design, this group of celebrities is well rounded off. Their trained faculties placed at the disposal of industry have made a lasting impression, and their fabrics are widely known and appreciated.

It has not been easy to call attention to the work of such men and women as these without appearing to be extravagant, and to avoid reiteration. For a generation these R.D.I.s have striven to create a setting for a decent way of life. In honouring them the Society has been honoured, for without thought of recognition in their separate ways they have proved that there is a place in the modern world for craftsmen, for good design and for quality of material and work. This brief and, I fear, inadequate article merely touches the fringe of all that this country and the world owes to men and women of achievement and character such as these.

HARRY TRETHOWAN.



Sideboard designed by R. D. Russell, R.D.I., and manufactured by Gordon Russell Limited and exhibited at Burlington House, 1935.



*(To the left)
English walnut on a bog oak stand,
designed by Gordon Russell, R.D.I.,
about 1929.*

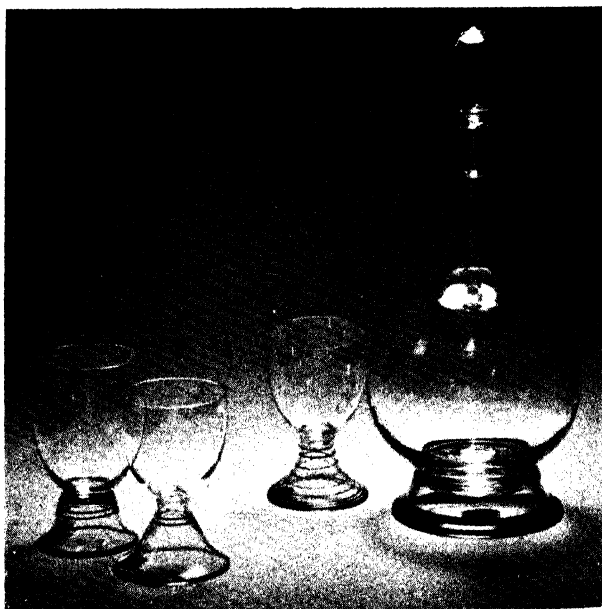


*(To the right)
Coffee set, "Moonstone," vellum white
glaze, platinum handle, designed by
Keith Murray, R.D.I., for J. Wedgwood
and Sons Limited and exhibited at
Burlington House, 1935.*



*Furnishing Fabric designed
by Duncan Grant, R.D.I.,
for Allan Walton textiles.*

*Decanter and glasses
designed by Keith
Murray, R.D.I., for
Stevens & Williams
Limited.*



OBITUARY

SIR JAMES PATON.—We regret to announce the death on August 12th of Sir James Wallace Paton, J.P., founder of the firm of Paton, Calvert & Co., manufacturers of a number of household cleaning materials, at Liverpool, who had been a life Fellow of the Society since 1919.

Sir James Paton was born at sea in 1863 on board the "Great Eastern" steamship, then the largest ship in the world, of which his father was the first Master. Before he was 21, Paton travelled several times round the world and was once marooned for two months on the Falkland Islands. He was knighted in 1919.

CHARLES EVANS HUGHES.—It is with regret that we have also to announce the death of Mr. Charles Evans Hughes, A.M., LL.D., D.C.L., Chief Justice of the Supreme Court of the United States from 1930 to 1941, who had been a Fellow of the Society since 1937.

Hughes had a long and distinguished career at the Bar, on the Bench and in the public life of America. He had been Governor of the State of New York, Republican candidate for the Presidency in 1916, when he was just defeated by President Wilson, and Secretary of State in the Government of President Harding in the years immediately after the Great War. He was President of the Washington Conference of 1921 on the limitation of naval armaments, and thereby did much to bring about an agreement leading to closer understanding between the United States and Great Britain.

GENERAL NOTES

A GREAT ALBERT MEDALLIST.—Full of years and honours, Sir Frank Brangwyn, R.A., has become a legend in his lifetime. With the possible exception of Sir Muirhead Bone, no other artist of our time has approached his prodigious output, and certainly none has ever had such a command of a variety of mediums. When the Royal Society of Arts bestowed on Brangwyn their highest prize, The Albert Medal, in 1932, they honoured a painter and etcher of international reputation whose associations with Art Societies at home and abroad would fill half a page of this *Journal*.

At one period of his career, when the spate of murals, paintings, etchings, water-colours, gouaches, pastels and drawings of all kinds was undiminished, Max Beerbohm made a joyous caricature of the great man posed on a step-ladder, brush in hand, "enjoying a well-earned half-minute rest"—and this little tribute to Brangwyn's indefatigable energy, returned to my mind the other morning when I visited a small retrospective exhibition of his works at The Fine Art Society's Gallery, 148 New Bond Street.

When one attempts to define the distinctive quality of Brangwyn's art one realises the inadequacy of words. An abounding vitality which reflects the exuberance of the man, a heightened sense of drama, an astonishingly vigorous line, a matchless eye for colour tones—all these attributes are his; but then are they not Rubens', Turner's and half-a-dozen other masters' also? Yet a Brangwyn picture—whether it be an early composition like "A Baghdad Market" painted half a century ago, or some spontaneous little water-colour of later years—is quite unmistakable, inspired as each is by the zestful spirit of its creator.

This collection acquired by the Fine Art Society consists mainly of paintings and water-colours, the earliest—the exquisite low-toned panel of "The Little Shop", and the decorative "Baghdad Market"—evidently belonging to the 'Nineties. Undated, but clearly much later, are perfect little water-colour views of "Manressa" and "Castello di Castruccio", a wonderfully luminous "Toledo", and the only pen-and-ink drawing here—"The Shipyard", presumably a study for the well-known etching of the subject. Here is an exhibition to visit, to reflect on, and to remember.

THE ART OF J. B. YEATS.—"Gusto is an immense virtue", our first essayist has declared; and gusto is, I think, the prime quality of the work of Jack B. Yeats, the veteran Irish painter and brother of the poet. Of some ninety pictures from public and private collections, at present assembled in three rooms in the Tate Gallery, there is not

one that fails to communicate the artist's overflowing exuberance of spirit. Colour of Venetian purity and brilliance he has handled with increasing freedom, displaying in recent years a child-like joy in dexterously manipulating with a knife the rich, creamy pigment.

The earliest works here, grouped in the octagonal gallery 23, belong to the 'Twenties—apart from "A Lift on the Long Car", with a superb Nicholsonsque cabman in a red coat outlined against the sky, which is dated 1914, and possibly another evidently early work lent by the artist. At this period, as we observe, his colour is generally low-toned and his figures scrupulously studied—a striking contrast with the brilliant palette, swirling forms and heavy impasto of his later manner.

"A Westerly Wind" is a characteristic example of Yeats' earlier style—a low-toned yet luminous Dublin street scene, full of atmosphere, and audaciously painted (like not a few Sickerts) with most of the interest on one side of the canvas. The little panel of a "Tilt Cart", much tighter in technique than his later work, the breezy "Old Walk, Dungarvan", and exhilarating "Here Comes the Chestnut Mare", which reveals the artist's love of horses manifest in this exhibition, are some other gems of the 'Twenties. To pass from these to his recent works, hung in the two further galleries, is like passing out of shadow into sunshine—a by no means unusual transition, as we know, in the development of a great painter.

Here glowing colour is all, or almost all; and to appreciate such a wistful painting as "The Old Days" the spectator must study the work intently, at a proper distance, detaching the canvas from its neighbours and entering so far as he may into its spirit. The airy impressionist "Wey Hey, There She Rises", the inspired "Men of Destiny" which catches the glow of a late Turner, and the impulsive "Whistle of a Jacket" all repay the closest study, and testify to the genius of the doyen of the Irish School.

N. A. D. WALLIS.

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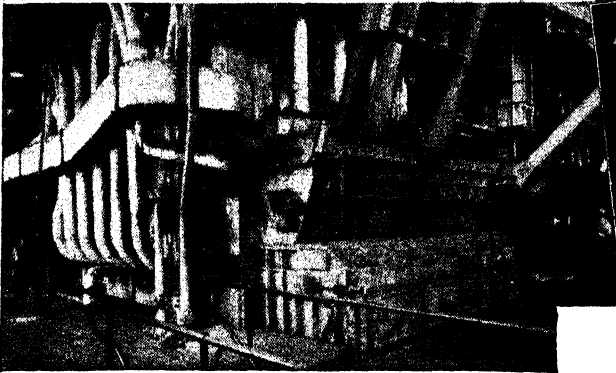
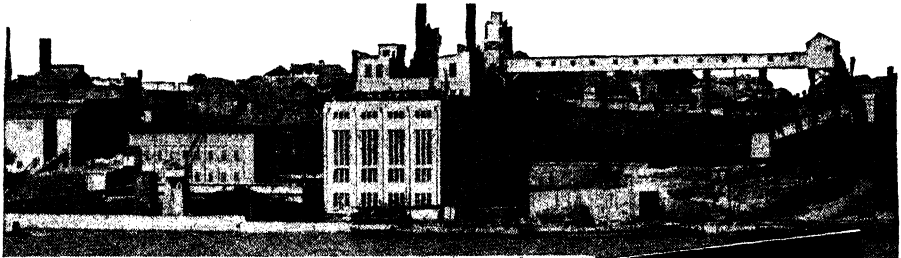
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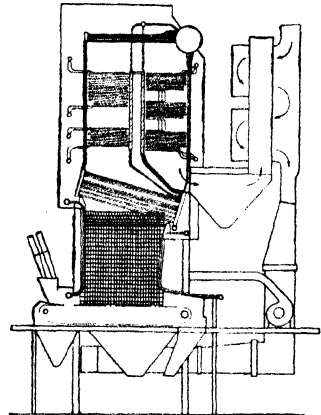


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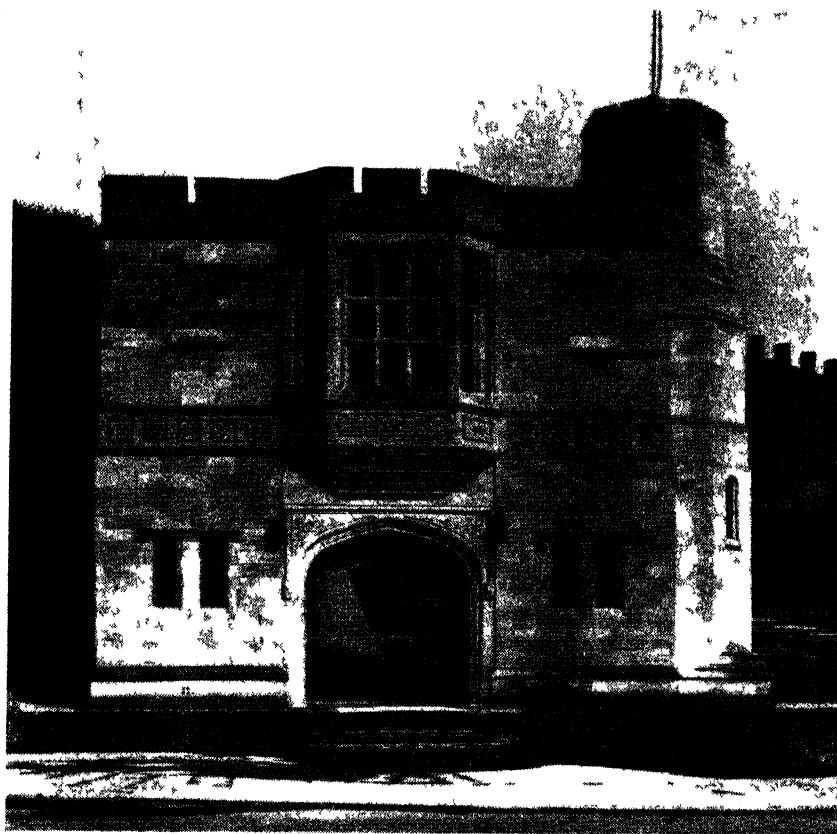
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No. 4778

FRIDAY, SEPTEMBER 24, 1948

Vol. xcvi

AWARD OF THE R. B. BENNETT EMPIRE PRIZE, 1948

Her Royal Highness The Princess Elizabeth, on the unanimous recommendation of the Council and the Dominions and Colonies Committee, has been pleased to award the R. B. Bennett Empire Prize for 1948 to Sir Frank Stockdale, G.C.M.G., C.B.E., Development Planning Officer to the Secretary of State for the Colonies.

In 1944, the late Lord Bennett endowed the R. B. Bennett Empire Prize of 100 guineas, to be awarded every third year for the most outstanding contribution from the Dominions, India, Burma and the Colonies to the promotion of the arts, agriculture, industries and commerce of the Overseas Empire during each intervening period. The first award was made in 1945 to Dr. C. Camsell, C.M.G., Deputy Minister for Mines in the Canadian Government, in recognition of exploration and mineral survey work done in the North West Provinces of Canada.

CRAFTSMANSHIP

(IX) CRAFTSMANSHIP AND THE SPARE-TIME WORKER

By MISS DOROTHY ALLSOPP, A.R.C.A., of *West Hartlepool Art School*, and
G. A. STEVENS, B.A., of *Cooper's Hill Training College*

Twenty-Second Ordinary Meeting, Wednesday, May 26th, 1948

J. HOWARD WHITEHOUSE, M.A., *Warden of Bembridge School, in the Chair*

THE CHAIRMAN: I have the privilege of presiding this afternoon at a meeting held to discuss a matter of very great importance. It is not for me to attempt to anticipate what the two speakers are going to say this afternoon, but I trust I shall not be guilty of anything which sounds like a platitude if I say that the subject of craftsmanship is a fundamental one in all phases of education and means a great deal for the happiness and welfare of this country. I have very much pleasure in calling upon Miss Dorothy Allsopp, of the West Hartlepool Art School, to speak to you first. I shall then call upon Mr. G. A. Stevens, of Cooper's Hill Training College.

Miss DOROTHY ALLSOPP, A.R.C.A., then read the following Paper:

My experience of women's classes in a provincial town leads me to believe that there is a tremendous urge in all walks of life for some form of craftwork which will both satisfy a desire to do something really well, and at the same time give release to the individual from the trials and problems of life as it is to-day. Among

women this desire is most easily and happily satisfied by some form of needlework whether it is the utilitarian kind which produces clothes for the family, or whether it is more decorative in character and results in something to please and charm the eye.

Before I go on to talk of craftsmanship and the spare-time worker, I must tell you something about the type of worker with whom I come into contact. The adult women students attending the West Hartlepool Art School, who number between five and six hundred, are drawn from all sections of the community and from most occupations and professions. There are many housewives, and these are attracted mainly to afternoon classes which they are free to attend once the midday meal is over and the children back at school. The evening classes are attended largely by women and girls who are engaged in some form of full-time work during the day. These include office workers, shop assistants, nurses, factory workers and many more and cover a wide age range.

In so short a space it is impossible to deal very fully with all of the crafts available for part-time workers at the Art School, and which include embroidery, dress-making, tailoring, millinery, weaving and fabric printing. I intend to limit myself therefore to embroidery and decorative needlework, as these apply to the spare-time worker in West Hartlepool. However, before going on to this, I must refer briefly to the craft of dressmaking. Classes in this craft have a very enthusiastic following. There are in fact seventeen afternoon classes and thirty-four evening classes per week and we feel very strongly that the School of Art is the right place to give instruction in this craft. Too often in the past, provincial Art Schools have concentrated on the training of a few students in a type of dress design entirely divorced from the dress of the average person. We feel that by taking in and making welcome this large body of people that we can really have some influence upon the local taste in dress. That we can help people both to choose and make suitable clothes and, by giving them an insight into construction and craftsmanship, can show them what to look for when buying for themselves and their families. I should add here that the influence of part-time students has a good effect upon the full-time dress design students who often produce whole series of designs for cotton frocks or blouses or children's dresses. These are displayed and used as models by the part-time workers.

While on the subject of dressmaking, it is surprising to find how many adults come to these classes for the first time with practically no knowledge of sewing at all. It is possible that the large quantity of cheap ready-made garments available between the two wars has had much to do with this. The average woman seeing a coat in course of construction for the first time is amazed at the amount of "inside work" which is put into a well-made garment. She is surprised to find that the canvas interlining in the lapels is attached to the material with row upon row of small tacks (this is called pad stitching), and that whilst this is being done the material must be curved over the fingers of the left-hand in order to give a permanent roll to the finished lapel. At first the inexperienced worker will resent the amount of tacking stitches she must use as a means of holding sections of material together in preparation for the machining of seams. She resents it because she knows that these stitches must eventually be taken out and so feels it so much wasted time,

but as she becomes more proficient she realises that all of this preliminary work is essential to the craft. Although adult students join the class in the first place for the sole purpose of producing a useful garment, I do think that most of them in the end really do enjoy the actual processes involved, and they do take a real and proper pride in their achievement. Much discussion goes on about the relative merits of the materials being used in the class and much helpful criticism on the subject of style is forthcoming.

From the many classes now firmly established in what might be termed the useful craft of dressmaking, arose the demand for one in which a variety of crafts might be learnt. These were planned to cover the making of gloves and slippers and toys, as well as embroidery applied to articles for use in the home and for dress decoration. A number of articles were produced which might give an idea of what we could do, and we avoided like the plague any suggestion that we should include anything that might be listed under the heading of sealing wax or barbola craft.

I have always felt that embroidery is a very important craft because it is so widely practised and attracts most women at some time during their lives. It may be pursued in relation to their own or their children's clothes or in making things for the home, but however practical the purpose is, I do feel that it really satisfies a craving for some means of creative expression. This certainly seems to be the case in the handicraft class. Students come for the express purpose of making gloves or slippers or handbags and as soon as they have done this they follow up immediately with some form of embroidery.

Now embroidery is not a difficult craft to learn as far as the technique is concerned. Its mastery could not be compared with, say, learning to throw a pot. In a short while half a dozen or more stitches can be learnt and a little practice will soon bring these to perfection. Embroidery too is a comfortable and sociable craft, it does not involve very much physical strain and providing that it is not practised in a poor light does not harm the eyes.

The main problem confronting the embroideress and particularly the embroideress in charge of classes of non-professional workers is that of design. Given a chance this type of worker can and will become a slave to technique and will put hours of labour, and the most lavish and loving care into the most unworthy kind of design unless some very definite guidance is given. We are faced to-day with a deplorably low standard in embroidery design as represented by the commercial transfer which is seen on every counter of the average shop and department which sells embroidery materials. There seem to have been little change in these for many years, indeed I often see to-day those I well remember as a child, the Dutch boy leaning over a gate, the crinoline lady whose face is conveniently hidden by a large bonnet, the thatched cottage with its hollyhocks and herbacious plants all carefully worked out in french knots. Apart from the poor design of the actual motifs, these are not, as a rule, designed in relation to the objects on which they are to be placed and so for ever remain superimposed pieces of decoration.

When dealing for a time with an adult embroidery class one quickly realises that a great deal of help and encouragement is needed with the design of work which is to be carried out by the students. The average housewife attending a

part-time class is usually very conscious of the fact that she can't *draw*, and she takes a good deal of convincing that the ability to draw with a pencil is not really necessary. It must be impressed upon her that when she sets the table for tea, or decides to rearrange the furniture in the sitting-room that she is in truth designing, and the same argument can be applied if she takes a simple leaf or flower or animal shape and fills this in with a pattern composed of stitches.

One also finds out very soon in an adult class that students are not content endlessly to work out simple borders in which the pattern is derived entirely from stitches, or patterns worked purely by the counted thread of material. Sooner or later each feels that she would like to turn her growing skill to producing shapes and ideas that are familiar to her—flowers, animals, figures and so on. When this is desired a simple design is sketched out for her—this is traced on to the material and she can work as she likes, simplifying or elaborating as she chooses.

The embroideress usually knows what she wants to make and as well has a strong preference for a particular type of design. Those which consist of floral shapes are most often requested. Floral shapes combined with figures are a close second in popularity, particularly for the decoration of tablecloths. In designing for a tablecloth we score heavily against the ready "stamped" cloth because the latter so often has a corner design—which is lost to view when the cloth is on the table. We usually arrange the design where it can lie upon the table (the argument being that in this manner the guests will be too interested in the embroidery to notice the lack of cakes). Birds are fairly popular and animal forms are liked by the less conservative students. Apart from these there is the occasional student who wants to record some personal experience or idea. Perhaps a holiday spent in Norway or Switzerland, or perhaps a map of the district in which she lives, and then we have embroideries to celebrate special occasions like the rather nice tablecloth made by the mother of three small sons which is to be used only for their birthday parties.

If a small embroidery is contemplated the design is quickly made in front of the student. This is a never-failing object of interest and the fact that it "*looks easy*" is often an encouragement for the student to try for herself (particularly when she gets home). In no case is any student ever compelled to make her own design when she first joins the class. A long-term policy is very necessary here—it is far better to encourage the students by making suitable designs for them than to let them become discouraged to the point of not attending a class. All the time they are working on given designs they are subconsciously absorbing the effect of colour, tone and pattern which the embroidery stitches give to the work.

Most adult students want to embroider something useful, and this I think it is important to encourage. A "useful" object which will both serve its purpose well and be a delight to the eye gives an important lesson in design. A tea-cosy, for example, must be the right size to fit the teapot; it will have certain seams which can form part of the decoration of the whole, and it must have a little tab or handle on top by which to lift it. I mention this particularly because we have had such keen competition in the making of these, and we certainly have had a variety. Here too there must be a lining—and a tremendous search goes on to find just the right one; students have even been known to surrender half a coupon in order to purchase material for this purpose!

A new and interesting article will quickly catch the fancy of the class, and spread to epidemic proportions in no time. Slippers and embroidered gloves have held sway. Embroidered bonnets can be seen in the street at any time during the winter months when the cold north-east wind whistles through the town. Nightdress cases in which a zip fastener is used as part of the decoration are popular, and tea-cosies have a very large following indeed. (So large, in fact, that on one occasion when a distinguished visitor arrived the fact dawned on me that in a class of between thirty and forty nearly everyone was making one!)

Strangely enough, although we are situated in County Durham, the traditional embroidery of the county, quilting, has never been very popular in the classes. The reason may be the difficulty of transporting large pieces of work, but I think it is more likely that the monotony of technique involved in this work is the real reason. Smocking, on the other hand, another traditional form of English needlework, is held in great favour because of its suitability for the decoration of overalls and children's frocks. The two overalls displayed here have been made in much the same way as the traditional countryman's smock, in that they are constructed from rectangular pieces of material and have no curved seams. The basic pattern has, however, been modified to allow for an opening at the front which makes them more useful for their modern purpose.

A few weeks ago a *design* evening was held in the class, and I have brought some of the results with me to-day. The subject set was one familiar to the students—again a design for one side of a tea-cosy and for the strip which would be used to connect the two sides. The students were each given a red paper foundation shape and were asked to cut from newspaper a decoration which would suitably fit the shape and make a pleasant pattern of grey on red. During the first fifteen minutes or so there was some hesitation, and one or two students confessed later that they had been absolutely terrified at the idea of "*designing*". However, in a very short while, they were all cutting away happily at their newspapers and thoroughly enjoying themselves. Several students were even so filled with enthusiasm that they missed their buses home! Some of the results were very creditable and will eventually be carried out in material. The experiment will certainly be repeated in the near future.

Finally, a point arises which I have not previously stressed—the importance of pleasant and interesting surroundings. No doubt it is possible to produce good work anywhere, but adult women students do react to a room which is bright and fresh and pleasant in every way. Here too, pictures, illustrations, books and show cases can help to stimulate ideas and create interest not only in embroidery but in many other crafts.

In concluding, I must say that I think that the spare-time woman worker can reach a good standard of craftsmanship, but for the average person this standard is most readily achieved in a group or class where some definite guidance can be given. In the needlecrafts this is of the utmost importance in order that the good technique of which most workers are capable shall not be wasted but guided (not forced) into the right channels. In a class of this kind, even *one* really good keen worker can become a central force from whom new ideas spring, and the good influence will spread out on all sides. In this way, the general level of taste and

craftsmanship can be raised, but I do not think that this can be done quickly. It must be worked out gradually over a period of years. A deeply rooted liking for certain designs and ideas which have been familiar cannot be eradicated overnight, and it is only by example and comparison that a change can be effected.

Mr. G. A. STEVENS, B.A., then read the second Paper:

I feel both very honoured that you should ask me to speak about craftsmanship and the spare-time worker, and very inadequate for the task. My only qualification for undertaking it at all is that my working life has been spent in *general* education, where people spend only part of their time in the practice of craft, and, for the past twelve years, I have been more particularly concerned with the adult who chooses to spend some of his time in craft work. I have been right up hard against the problems involved, and in a position of responsibility where I have had to try to do something about them.

I am indeed glad that the talk has been thus titled. On the one hand, craftsmanship, with all that fine word implies. On the other, the spare-time worker, the amateur, perhaps the dilettante. Can we bring them together?

I have always noticed two impulses in the spare-time worker, two perhaps, more important than others:—

- (1) The impulse to make a useful article.
- (2) The impulse to decorate a surface.

Now, I contend that each of these impulses is perfectly natural and healthy, indeed, they might be further defined as the impulse towards craft and the impulse towards art; but unfortunately, in practice, we find the two impulses almost hopelessly, inextricably, intertwined and confused. Let me illustrate this. With woodwork, one finds a great fondness for machine-made Jacobean twists, pressed mouldings, chip carving and even fretwork; highly figured veneers, glass-like French polish, chromium-plated and plastic knobs and handles; cheap deal and spruce, stained and varnished in imitation of hardwood; graining; limed or pickled treatment; rococo or modernistic treatment of moulded backings or cornices. With textiles, one finds a fondness for excessively pictorial motifs in embroidery or rug design, galleons, crinolined ladies, Service badges and crests, in satin stitch, silk on crash or canvas—an almost complete dependence on ready-made patterns transferred on the fabric. Bowls of roses and peacocks or setting suns spread themselves over hand-tufted rugs. In leatherwork, an excessive use of coloured stains, pictorial tooling and modelling on handbags, and thonging rather than hand sewing.

This confusion of thought, feeling and taste can be further illustrated by the horrors one sees so often in art and craft exhibitions and sales of work. Hand-painted patterns on machine-made glassware and painted decoration on mirrors—plaster casts of animal figures and human masks realistically painted and varnished—poker work, barbola work, embossed pewter work—thin sheets tacked on to ready-made boxes; decorative painting on similar boxes; all manner of lampshades, horrific both in shape and colour; so-called “artistic” lettering and illuminated texts in Gothic characters. Somehow or other a perfectly honest piece of sculpture in wood must be contorted into an inefficient ash-tray or book-end. An oil painting

must be framed into a firescreen, or a piece of embroidery framed and glazed and hung on the wall as a picture!

In all this, there is no element of craftsmanship as I understand it at all, no appreciation of the essential qualities of material whether fine or coarse, no appreciation of the style that comes from the use of good tools, no realization that design must originate in the possibilities and limitations of the appropriate material married to the purpose for which the article is needed, and lastly, no sense of fine decoration, because this follows from the other values.

Yet it is these things I have described above which very many spare-time workers really do like to make, and think it worth while spending time on. These things are also all around them in the shops they know best. And the workers are aided and abetted by the countless "how to do it" manuals and predigested "kits" of parts and blue prints, with which the market is flooded.

What then is the spare-time worker, left to himself, doing? He is:

- (a) Passing the time with an all-absorbing mechanical activity.
- (b) Enjoying the physical act of using his hands and part of his mind.
- (c) Eventually producing an article which he needs, which can be used, and which expresses the fact that he has devoted many hours of labour to its completion.
- (d) From this he derives a sense of achievement, pride in skill and a systematic method of working which is almost cast-iron.

The cynic may say, why not leave him there? He is perfectly happy on this repetitive imitative level. It is doing him good. It is therapy! It is always difficult to counter this argument, to show convincingly why it is a good thing to try to influence an individual away from complacent satisfaction on one level of achievement towards a discontent, uncertainty and misgiving, which may ultimately be divine, but which is certainly pain and grief at first.

I think, however, there are two all-compelling reasons why we may justifiably try to influence the spare-time worker.

- (a) Because we are convinced that we can help him individually to a much deeper satisfaction on a higher level.
- (b) Because we are not only concerned with the individual but with the community as a whole of which he is a part. I believe that complacency, satisfaction with the second-rate, is the deadly enemy of true art and craftsmanship, and I believe that it is ultimately on the fastidiousness of the ordinary man and woman, and particularly on the fastidiousness of those who, at least, have thought it worth while to put their hands to something, that the quality of our whole culture will depend.

I believe, in short, that the spare-time worker, in spite of all his stiff-necked cussedness, is the king pin in our collective progress in these matters. He is the only bridge between those who don't care at all, and those who care so much that they cannot be bothered with the amateur; therefore, I respect the spare-time worker and place enormous importance on his key position.

So much for the situation as I see it, and for the principles which have provided such drive and inspiration as I have been able to bring to my work. Now for practice.

First of all, let me say a word about my own meagre equipment. I am a spare-time worker myself, practising my own craft of painting regularly on Sundays and holidays. Indeed, I could not go on professing to teach in art and craft unless I did so. I also exhibit and sell my work and execute commissions when I get the chance. I have some first-hand experience of woodwork, carving, pottery and modelling, lettering and weaving, but my understanding of these crafts comes more from my deep admiration of the master exponents of them. By profession and experience I am a teacher in general education, that is, I am more concerned with the all-round development of ordinary citizens than with the vocational training of experts. That means, I think, that I am ultimately more concerned with the development of the worker's understanding than with his technical proficiency.

My main experience of the spare-time worker in crafts came with my twelve years' work with the National Council for Social Service. First of all with men and women who were out of work and latterly with members of H.M. Forces under the war-time Education Scheme, and with adult members of clubs, settlements and community centres.

The unemployed had to build and recondition their own club premises from scratch, and I was soon in demand to advise on their decoration. I tried from the first to get them to choose their own colour schemes and actually to mix their own paints. A good deal of colour theory came into this, and particularly, the effect of colour on the feelings. This led in turn to murals, and such details as room notices and signboards gave opportunities for teaching lettering.

I soon found the women equally interested in decoration and colour and furnishing, and they also applied this knowledge to their own dress. Stage-setting and the treatment of the proscenium arch, model and puppet theatres and even an interest in architectural model-making were allied activities which came in for special study. An appreciation of the special qualities of soft wood, building timber (pre-war) and plywood led to good design and honest workmanship in those materials, and a gradual abandonment of stained and varnished finishes in favour of either clear varnish or painting in gay colours. This last came in particularly in relation to children's and nursery furniture. This, in turn, led to the making of wooden toys and the designing of original sturdy types of toy.

Where "art" as such, was in demand, original murals and the painting of scenes from everyday life were encouraged. *Copies* of pictures and photographs were ignored rather than forbidden. Direct modelling and carving in wood and stone were also encouraged, to give experience in variety of materials and tools. Lastly, exhibitions, competitions and display were taken very seriously indeed, and guided into directions which tended to make them more educational events.

Not a very impressive or profound account, you may say. Where in all this is a proper and systematic introduction to the basic crafts, e.g., pottery, weaving, book crafts, etc., etc.? These were by no means ignored and wherever possible, were fostered. It will readily be admitted however, that the successful practice of these things depends so much on the coming together of the skilled teacher, the predisposed pupil and the right equipment.

Our purpose was rather different. We had to start with our workers' immediate and urgent needs; household repairs, boots and shoes, furniture, upholstery,

comfort and brightness in home and club. In fact, this hard bite of sheer necessity gave dignity to our work. Nor were these needs only material. The long-unemployed manual worker, the "browned-off" soldier, the consumptive and the cripple, all desperately want to become effective in some way which will offset whatever frustrates them. We tried to help them to think clearly about what they wanted to make, to choose the best available material and work it honestly, and to give it a pleasant and decent finish. This may not be the whole of craftsmanship but I think it goes some way towards it.

DISCUSSION

THE CHAIRMAN: I am sure you will agree with me when I say that we have listened not only to two very interesting papers but to two very inspiring papers, marked by that knowledge which comes from practical experience. I should like to state that I believe that if craftsmanship were practised and studied in all schools, it would be a very great reform in our educational system. In the public school with which I am connected I have had the privilege of introducing the teaching of craftsmanship to every boy. We have been able to do things which have led to very great happiness and which have, I think, influenced their future lives. Our school is by the sea and many boys have built canoes and even sailing boats and have had the best of all possible lessons in the principles of beauty. I remember one case where two boys built a sailing boat and when the end of term came, with the permission of their parents, they got into the sailing boat they had made (the grounds of the school end in the sea), and in two days they sailed home to a point some little distance from Southampton. They did it quite safely. I remember other cases where the practice of craftsmanship has led boys to ask to do things for the help of the school. For instance, we wanted a considerable wall built and three boys came and volunteered to do this in their spare time. I went to watch on the first evening and they had erected a great notice board saying, "Balbus, Hadrian, & Co., Wall Builders". But the remarkable thing was that this wall was built twenty to twenty-five years ago and stands to this day. It was good, honest work.

Finally, may I add this? I think that all the great men in the past who have raised mankind to a higher level of thought or action have been craftsmen. Let me mention Leonardo and Michelangelo in ancient days, and in modern days Ruskin and William Morris. Our debt to them could not be expressed in a few words. I think all connected with education should work for this great reform and make it a living influence in all the schools of this country to their very great benefit. There are three words I think of in pleading for the teaching of craftsmanship. I hope our two distinguished speakers this afternoon will agree with them. They are: Sincerity, suitability and simplicity. Sincerity means that there must be no dishonest work; it must be honest. Suitability means that a thing should be made suitable for its purpose. This is obvious but fundamental. Simplicity means that a thing should have no needless ornamentation. It should be true to the principles of beauty.

Captain G. F. GRACEY: I was very much interested in the two most excellent lectures which we have listened to this afternoon. For a long period I have been identified with and interested in handicraft work of many kinds in various parts of the world, and the thing that impressed me, besides those that have been mentioned, was that in teaching handicrafts whether it be to boys or girls one is teaching poise and stimulating in them an interim interest in the things which they are making.

Another aspect which I would like to bring forward is the very important role handicrafts could and should play in relief work. It has been my privilege to have worked in Turkey, Persia, Iraq, Syria, Greece and the Caucasus, where handicrafts have been taught to refugees in the relief camps and I have watched the refugees find their own souls by means of this and also an outlet for their individual talents, instead of sitting moping over their terrible conditions.

More recently I have visited Europe and saw Letts, Latvians, Lithuanians, Yugoslavs, Hungarians and Germans, whose outlook seemed hopeless, yet the one bright ray was to see them use their hands in making many useful things not only for themselves but for the community. In this way character was being rebuilt and a new interest in life was being renewed.

May I suggest that when any other of these most helpful and useful talks are given, they will point out that we require more enthusiastic young men and women who will make this their vocation in life, to teach handicrafts at home and abroad to the underprivileged boys and girls.

QUESTION: I should like to inquire whether there is somebody in London doing something similar to the good work being done in Miss Allsopp's district, not for the expert but for the beginner or the amateur worker.

MR. STEVENS: Yes, there is excellent work done by the L.C.C. Evening Institutes. Particulars can be obtained from County Hall. They take people with no previous knowledge or practice of crafts, and classes are situated in various districts. There are also voluntary bodies like the National Union of Townswomen's Guild, which has a little staff of advisers and leaders. They have units in most suburban districts in London. The Women's Institutes are more strictly rural but even they have branches in the outlying suburbs. Then, of course, there are Educational Settlements, and Community Centres very often have classes now recognised by the L.C.C. or whatever the actual educational authority for the district may be.

These are not subscription lectures, but are practical classes. I think the subscriptions for them are very, very small. It is simply that you have to provide your own materials or, if these are priority materials, you have to pay for them as used in the classes. I have given three sources of information, but the most obvious one is the publication "Floodlight," which gives all particulars. There are also spare-time classes at the Central School of Arts and Crafts, but I think they are pretty full.

QUESTION: I was very interested in Mr. Stevens's reference to whole-time adult classes in handicrafts. I should like to ask how long the amateur takes to assimilate enough knowledge of sculpture or painting in order to be able to carry out some work on his own, not professionally but to a reasonably satisfactory standard.

MR. STEVENS: I do not think I mentioned whole-time classes. I did, however, refer to the service provided for men and women out of work. They were, of course, whole-time students because they had nothing else to do, but for the most part the instruction was always part-time and most of the practice is part-time.

I think it is impossible to answer the question fully, as it depends on the individual. I should, however, say roughly within a year, if the person takes up something like modelling or carving. Within a year they should be able to produce a certain range of satisfactory models which would hold their own in any exhibition of such work. I have known it happen in a shorter time in the Services because, as a general rule, when a variety of activities are offered, an adult generally chooses something he has a bent for. If he has chosen something he has a bent for, whether painting, carving or lettering, he generally becomes fairly proficient in it with application. I believe in what Miss Allsopp said, that it is the beginners who must have the most expert instruction because people can so easily get off on the wrong foot and the wrongest of wrong feet is the little general information book with the ready-made patterns.

THE CHAIRMAN: I am sure that you would wish me to convey to Miss Allsopp and Mr. Stevens our sincere thanks for their addresses this afternoon. If you are in favour of that will you kindly signify it in the usual way.

The vote of thanks was carried with acclamation, and the meeting then terminated.

CRAFTSMANSHIP

(X) THE SPIRIT OF BRITISH CRAFTSMANSHIP

By Professor A. E. RICHARDSON, R.A.

Twenty-Third Ordinary Meeting, Wednesday, June 2nd, 1948

Mr. GORDON RUSSELL, C.B.E., M.C., R.D.I., *in the Chair*

THE CHAIRMAN: It is a very great pleasure to me to preside here at the last of this series of lectures. Professor Richardson needs absolutely no introduction from me. He has not only written a number of books on all kinds of subjects but has dealt with this problem from the architectural angle particularly. He is especially interested in the eighteenth century, and I am sure we are all looking forward tremendously to what he is going to say to us this afternoon.

The following paper was then read:

To be invited to crown a series of brilliant lectures calls for a nicety of skill which I do not possess, and what I find to be of greater difficulty is to pronounce on the abstract qualities of insular craftsmanship. Yet the duty is a bounden one and the subject is germane to the problems which confront us all to-day. What is of the utmost importance is that we should all try to implement the ideas which have been put forward by previous lecturers: that is to say we should adopt each constructive suggestion and find some way of making it operative. I will begin with a very pertinent question. What can I tell you that you do not already know? Here is a subject which for more than a century has occupied the thoughts of all well-wishers of the crafts. Now the wheel of circumstance has come full circle and we find ourselves in the same perplexity as that which confounded our predecessors in 1848. We have adventured much, we have dabbled with one fashion after another, and we have not advanced the crafts one whit. In fact we have to start *de novo*. The terms Art and Craft are synonymous, but the crafts preceded the arts which resulted from shaping things for use. In the beginning, man sensed beauty, and what this means he has never been able to define, but he does not despair; hence the innumerable definitions of what Craft or Art implies. Art is the Aurora of the visible world; the great hills, the boundless oceans, the sombre forests are Nature's symbols which are lit by the sun, darkened by storm or blackened by night. These phenomena have moulded the moods of mankind, have inspired the will to create. In time man possessed imagination and this led to Art. Man has wrested sublime secrets from Nature, and these he has modified to suit his needs and fancies. For he was created a creature of vague beliefs and illusions and was foredoomed to pursue ideals. Very early on he made the elements his slaves, hardening clay by fire, and by the same agency making a translucent film in which he could enclose space. He picked up rare stones and polished them: from the earth and from the fruits of the earth he took stains to make pictures of his fellow beings and other creatures. Some of the colour he transferred to his skin and to his clothes. From the depths of forests he sensed the system of timber construction which suggested pillars in stone, the masts of boats and other things which are familiar to our eyes. Art which arose from Craft soon became an epitome of Nature's truths. With this sense of power denied to the

brute man projected thoughts and ideas to remote posterity. Continuity of social progress was assured; elemental advances became liberal truths, while outstanding conceptions formed almost indestructible records. The plastic arts developed apace and came to be symbols of man's superiority. Soon succeeded the power of analysis, for art proved to be a subtle phantom ever surging to fresh endeavour. Man saw his creative work as part of himself, he came to a vague understanding of the beautiful, and here he was checked for he could not define the meaning of the shapings he had wrought.

Now, our learned savants tell us how the mainsprings of human inspiration started. Little does it matter whether we attribute this cause of man's early environment, to his association with his fellows, or to his limited concept of the spiritual. Little would be gained if we could fathom all knowledge. But if we are content to accept the truth of individual intuition for perfection, then we are in a fair way to accept the value of variation which is the basis of originality. Of one thing we are certain: very early in man's history the crafts came into being, for with deliberate touch, in exact promptness to an alert brain, materials were cunningly shaped and refined. Man's weapons first received extra attention; the bow, the spear, the sword, the club were shaped and re-shaped. Soon came the thrill of possession; clothes, ornaments, jewels. Then crude images, then crude sculpture, representing deities or spirits superior to man. Yet everything is the image of himself. Pictures recording incidents of life led to the invention of graphic illustration; finally, geometry was defined. *Craftsmanship became identified with drawing on different material surfaces*; weaving became part of pattern making in complex netting. By erecting houses for his God's and his own convenience, simultaneously, man learnt to combine all the arts and to extend the latent skill which surprised him. His woman adored him for his superior intelligence; she was content to watch and imitate the dexterity of this superior creature. Man little thought his skill was due to the more subtle vision of the woman who possessed him. Man was pre-ordained to stumble upon art through the essential crafts. It was inevitable that he should recognise the works of the deity and should try to translate them to his own lowly status. Art was to become part of man's being, was to crown his thoughts; in time it would elevate social progress and crystallise the aims of whole periods in tangible form. The useful crafts are progressive and can never be repeated in exactly the same manner. The terms creation and variety have the same meaning, but the craft worker requires the spiritual comfort of encouragement. He cannot be expected to contrive and at the same time prescribe for the needs of his fellow beings. The task of the craftsman is in the nature of specialised individual expression; it is something apart from all embracing skill which belongs to the creative designer. The craftsman is but the devoted servant of his fellows, not their art mentor, neither should he be a docile slave; this is a point which is apt to be passed over.

We have also to consider many other factors of the arts and crafts. Take, for example, the constitution of society as it is to-day; we find a new estate already in possession of the conserves which were once carefully maintained. This is the age of substantial changes in standards of living. Cities and towns have swollen abnormally; the pattern of the countryside has coarsened, and other forces are at work which are not entirely beneficial. The general social level has improved, thanks to the

widening of the educational circle, but the nation has gained little in the way of compensatory values. In encouraging the training of officials, clerks, and factory operatives, the importance of apprenticeship to the crafts has been overlooked. What a boon it would be at the present time if our well educated young people were able and willing craftsmen. It is true that many are very competent as mechanics on the engineering side, but the actual craftsman is in the minority. Thus, while the number of minor social strata have been increased there are differences of level between skilled and unskilled workers in all trades. The building industry, for example, is not what it was twenty years ago; there is decline in the way material is handled as there is in the apathy of youth towards work of the hands. Social stratification tends to encourage social inequality in which inferiority of ability leads to jealousies. Whether general equality is a political *desiderata* is another matter. My own view is that craftsmanship represents the aristocracy of labour. I have never heard a member of His Majesty's Government speak in favour of craftsmanship as such. Well, opinions on this question vary very much indeed, for the prescience of our leaders cannot control evolutionary forces which are not only powerful but are above rules and ordinances. The whole problem of the future of the crafts has to be reduced to very simple terms before we even begin to grasp what is implied in these complex times. We have to consider how to better the art of living for the greater number. This does not concern food or even measures of health, but it does concern the cultural values of daily life. The conditions which produced the art equations of mediæval and Georgian times no longer apply, neither can it be claimed that country life is more distinctive from urban life than it was fifty years ago. The tendency is for the urban to swamp the rural influences; you notice this in almost every part of England.

Some prophets opine that a new art will spring up which will bring a re-orientation of the crafts. My own idea is that out of nothing, nothing will come. Others, to whom town planning is a fetish, shirk the problem of social amenities by urging that the whole of the remaining countryside should be industrialised. If it were possible to buy dollars in this way, this would be sanctioned by Act of Parliament. There still remains the task of sustaining the flickering spirit of British craftsmanship. We must not imagine that everybody in these enchanted islands is craft minded; neither should we pin our faith on the superior wisdom of theorists. Carlyle prognosticated similar conditions to those we know more than a century ago; William Morris was even more practical because he attempted to check matters with his own hands. He failed because he was right. Curiously enough the Swedes adopted his doctrines and now we admire modern Swedish art and craft as something exceptional. The origin of modern Swedish art virtually began in England in the late "eighties", when we were slumbering on the filthy straw of Victorian opulence. The Sphinx riddle to be answered now is how can British craftsmanship be strengthened and maintained? We do not seek to oppose the machine but we need handwork for the sake of the machine. Putting aside the mechanical crafts such as scientific instrument making, the manufacture of components in bulk, and the production of metal accessories for all the trades; there is need to concentrate on improving those crafts which are germane to everyday things. It will be urged that this is done already by various bodies. Well, my answer to that is, why not allow a

little more freedom to the individual; why dictate so emphatically? We live in an age when most things can be obtained at will from a multiple store. There is a crude standardisation but there is nothing of more than momentary value. Even in circles a little more dignified it is rare to find things shaped to elevate taste and improve manners. We have passed from one phase of fashion to another, a more recent one. There is no real change. I have noticed the same monotony of form, the same flashy materials and the same boring statements. Everything appears to be so streamlined, so smooth, so practical and so commercial, that the spirit of art seems ironed out. The fact is the tendency up to the present has been to extol heresy at the expense of truth. You will find proof of this in the low-grade productions which capture popular favour. It is left unfortunately to the few to revolt against such tyranny and seek for better things. The realm of art can be divided into two groups: the contrivers and the recipients. The first group is comparatively small, the second group is legion. There is the thrill of giving and the thrill of receiving graciously; but the giver is required to make sacrifices, the receiver to receive with gratitude. This can only apply to an ideal world.

From this we gather the usefulness of patronage for encouraging the arts and crafts, but we have the additional task of civilising the recipients. The aim should be to raise the art of living by offering to provide beautiful things, not their sordid opposites. The ordinary man is not at present in a position to cultivate the simple pleasures of life; these have to be suggested to him by precept and exemplar. This should not discourage hope of gracious settings for home life. Since the middle of the nineteenth century, when the crafts became fatigued, all sorts of artificial aids have been tried to jerk them into motion; alas, without permanent reaction. We realise the growth of the arts to be slow, and that only at times of national expansion have changes been spontaneous; as, for example, when steam power was invented. Those who accepted this tremendous aid to manufactures could not predict the forces which its energy would unleash; neither was it foreseen that comeliness would depart from work-a-day living. Spontaneity in the crafts, therefore, is to be viewed with suspicion, for it is inimical to the retentive process we call tradition or truth. When we ignore experiences and seek to project ideas too far ahead we frequently have to retrace our steps. I have a thought that the craftsmen of old worked by intuition, and that a common understanding of the workings of a craft was shared by all. This intuition which is so much finer than logic forms the basis of taste, and in this there is hope for the future. Every human being is an artist in some form or the other. Some proclaim the antique, others the modern; yet others have in view the merging of the old with the new. The new must grow out of the old and there is a good deal to be said for this form of evolutionary craft. This theory, in particular, conforms so excellently with the national ideal of compromise, that is to say, the acceptance of a mean between two extremes. Be this as it may, we have still to realise how rich we are and what possibilities await the insular genius. What is most urgently needed is a constructive policy to quicken the crafts which are moribund.

This is the dawn of a new renaissance in which things more beneficial will be forthcoming. The tenacity of the race, the resourceful depths, the indomitable will-power, the desire for perfection, are the mainsprings of endeavour.

Nothing should be impossible. The experiences and the contributions of the world are at the disposal of those gifted with skilled hands and cultured minds. What is there lacking if we really desire to get the most out of existence? This is the problem we have to solve and there is no escape from the evil consequences if we fail to solve it. We shall need to be audacious, but we might also be humble. It is a case of small business done well, not vast commercial enterprise scattered abroad to attract hard currency.

It is time to return to the subject of this lecture and state certain facts. You will agree that the first principle in craftsmanship is that the object should be well-made; the second principle is that it should be good to look upon. If the craftsman is not the designer, then he shares the responsibility of giving pleasure to the recipient of his work. It is also obvious that both designer and craftworker should be in accord; there is still the condition that the public should share in the general motivating ideal. If the latter is national then all is well; if it is merely fashionable then the result will be yet another contribution to a transient art phase. Apparently the taste of a whole people is of great importance to the vitality of the crafts. At one time there was the mediæval spirit, at another time the renaissance spirit; these ideals or images did not stultify art endeavour, they were part of the common belief and the arts and crafts flourished in this belief. It is agreed that an ideal should have a contagious effect. Yes, perhaps so, but we are still faced with the need for an idea suited to the conditions of to-day. You cannot call forth an ideal at will; it either exists or it is nought. The classic grew out of the pre-classic, which grew out of the primitive. Gothic, on the other hand, grew out of classic. Renaissance art derived from Romanesque and classic. Well, what is the next move? I suggest that if we analyse the character of the arts and crafts in this country through the centuries, we shall recognise that we have an ideal in embryo; the fact that we were accepting our own national standard of achievement, for an ideal would inspire respect in all breasts. It is not an unworthy ideal; the alternative is to take an art ideal from some other country.

From the middle-ages to the present day craftsmanship in this country has achieved some very notable successes. We should be bold and we should acknowledge these triumphs. Study and suitable exposition would reveal to the mass of the public the existence of a national manner in the crafts. We should form incipient interest and watch it flame like a beacon. The animating spirit for the extension of this national ideal would be the emulation of qualities of craftsmanship rather than sedulous imitation of old forms. It would soon be understood by clear-minded people that continuity of endeavour was of great value, and did not moreover, preclude variation from whence originality might succeed. The acceptance of an ideal based on the renaissance of the English character in the arts and crafts would be better than *Modernism or the New Look*, "Super Ultraism" or any other yearning spasm. The furtherance of such an ambitious enterprise would need the greatest skill, for the minds of all men are different; intellectuals vary so profoundly; taste is so unequal. Besides, there is no disputing about taste and men and women are impatient of advice. Well, be that as it may, let us suppose that such an ideal as the one suggested could be indicated; the next step would be to encourage its acceptance as a policy in the Schools of Arts and Crafts.

It would be helpful to rearrange the collections of furniture in the public museums and to show everyday things past and present in sequence. They have done this well at Stockholm. The Folk Museums might follow the example of the National Museums. Gradually everybody would understand the beauty of simple well-made things. In the great arena of human activity much could be done to spread a desire for the beautiful. Training in the technical schools might be more comprehensive than it is at present. The building industry is in dire need of craftworkers. There are still things which are best finished by hand; this is not to disparage the usefulness of the machine. It will be said we have heard all this before; much of the same sort of thing has been included in the brilliant series of lectures already delivered in this hall. This may be so, but it does not abate my duty to emphasise the importance of training young and well-educated people as craftsmen and craftswomen.

Reviewing the situation to-day we are bound to admit that everything is ready for a revival of British craftsmanship. We are, for instance, on the threshold of a great period of building activity in which lithic construction will take first place. We are also confronted with the need to find congenial employment for myriads of educated workers. The next thing to be considered is that indefinable something we call public taste. We know from sad results that taste is not to be made popular by legislation. Governments and civil authorities have a peculiar aptitude for depressing public taste. Admittedly the task is a difficult one for the phenomenal growth of towns has destroyed the finer aspects of country living, but this does not explain why town life should not be improved. We are creating a vast industrial class who are better educated, have more leisure, are more comfortably housed, and have more money to spare than was the case a generation ago. There is a danger that these splendid people may become helots. Their lives are indexed and assisted from the cradle to the grave by omniscient bureaucratic departments, but unhappily, nothing is done to elevate their artistic outlook. This is where sympathy and helpful direction is most needed. These industrious citizens are the hopeless victims of the lowest levels of fashion; they are the first to suffer and the very first to be scorned. Here we have fine recruits for the training centres in London and the Provinces. I suggest the founding of craft centres in every district where such places do not already exist. Here youth could be trained prior to apprenticeship to builders, masons, metal workers and others. I would have special centres for women trainees in the more subtle crafts of needlework and stitchery. The aim should be a rehabilitation of the regional system, especially the employment of local materials. We cannot hope to convert millions to a liking for the crafts but we should at least attempt to leaven the mass. Our duty is to give to others some part of the understanding we have acquired so painfully.

THE SPIRIT OF BRITISH CRAFTSMANSHIP

I have thought it best to deal with the main theme of my lecture in the form of an epilogue. It has certainly been the most difficult part of my studies and has demanded some detachment from ordinary working hours. For training the mind, improving the selective power, and for storing up information for future reference, nothing could be better than a life's study of the arts and crafts. For these cover all the

essential interests of human activity ; the building of houses, the furniture and decorations ; the accommodation of every vocation, and finally the growth of cities. When we consider the importance of the crafts and the fine arts to the prestige of a country we wonder why they are so neglected. Yet a little consideration will prove that much that is best in the English character is due to the spiritual interest of the arts. When this Royal Society was founded for the encouragement of the Arts and Commerce, England had reached the very pinnacle of polite attainment. Since those days there has been a wide expansion of the original purpose of the society, due to the great prosperity of the nineteenth century. Now, once again, at a critical stage in the history of the nation the Royal Society of Arts stands forth to maintain the handicrafts upon which the soulful future of the Fine Arts depends. It is just as important to reinstate training in craftsmanship as it is to found scholarships for the appreciation of the Fine Arts. I will go so far as to say that much of the rubbish which masquerades as painting and sculpture would disappear if the simpler crafts were encouraged as of yore. For my purpose I have to consider two branches ; one concerns the Industrial Arts, or rather, the arts associated with commercial enterprise ; the other concerns the aristocratic crafts of the master carpenters, masons, brickworkers, tilers, metal workers, plasterworkers and many others. In the industrial branch the artist-designer has command of skilled artificers and very intricate flawless machinery. The bias in this case is in the hands of the designer. This process does not make the results less artistic. The method of production is suited to the increased demand, and if the designs are superb the system is justifiable. It will be seen that this system calls for very precise handling both in staff and equipment. It is also demanded that the materials employed in the process are of the finest. Design and colour are perhaps the most important considerations. In the second or more intimate branch we encounter something entirely different, for the skill of individual specialists comes into action. Take, for example, joinery or furniture ; this is designed to scale, then set out accurately to full size ; in some cases full-sized models are made. Then the wood is prepared by the machine in readiness for finishing and assembling by the joiners. In the very best work the mouldings and shapings are determined by hand. The fact that the machine is used to economise time and manual labour does not detract from the charm of the finished work. I recall a very elaborate lathe in the Musée de Cluny, Paris, which was used to produce the finest renaissance furniture. It has been my privilege to work with some of the foremost craftsmen in England ; need I tell you how much I respect their attitude towards life and craft. These men live for results and the pride they take in the finished work is encouraging to everybody. Apart from special saws and lifting tackle the work of the skilled stonemason has not changed through the centuries. The production of bricks and tiles, the quarrying of slate for roofs, the casting of lead and the handling of iron, has not varied since the Middle Ages. When it comes to the shaping of great timbers for important buildings the English carpenter is as skilled to-day as his predecessors who worked for Sir Christopher Wren. All the so-called methods of economy, ponderous structural skeletons, the ersatz substitutes, are merely aids to avarice. For buildings can be dishonest if they are devised solely for commercial expediency.

Those who desire beauty can possess it by using their eyes. Taste can be developed

but there are no rules, only certain principles which are useful. Here are the main principles:—

- (a) The material of which the object is constructed and its intended use must determine the form.
- (b) The structure of the object must encompass the design.
- (c) The ornament or decoration, carved or painted, should do nothing more than emphasise the structural form.
- (d) All ornaments should be conventional.

Now if we take the furniture and fitments of say an eighteenth-century house we shall find these principles very closely observed. The fact is the old craftsmen were very clear headed; they introduced their own character into the work upon which they were engaged. That they did this in an impersonal, disinterested way I am equally certain. When the craftsman became self-conscious and sophisticated he developed an inferiority complex, with disastrous results. For example, architects discovered they could not design chairs and tables. Regarding the spirit of British craftsmanship, that is the best of it, irrespective of period, style or make, I can say that it is naturalness which makes the greatest impression. The appeal is made to the plastic power of the eye which stimulates the senses, but the appeal originates in the first instance with the spiritual character of the work or object. The presence of this abstract element is the main secret of every outstanding example of craftsmanship. And what is the essence we name the spiritual other than the manifestation of intuitive reason or discipline. This also explains the sense of equipoise, a sort of nervous tension on the part of the worker which is imparted to the material. This may be due to the desire to be thought progressive, or it may be part of the natural wish to achieve something fine. When we consider the impelling spirit of the crafts we also encounter the limitations of the skilled hand. We begin to question the origins of form and to wonder. The answer is the highest, is ever constant in the soul of man, forms in fact a centre from which quality radiates. Craftsmanship is the expression of the imagination and the heart; it is directly related to pleasure, hence the thrill it conveys to those attuned to its merits. It speaks directly to all men; for if it did not it would fail in its chief purpose. It is a very serious accomplishment, not the trifling recreation of idle hours. It has absorbed myriads of human minds through the ages. Many people suppose that its manifestations belong to careless meanderings of the hand and mind, and for that reason it should be suppressed. And so time and again, attempts are made to eliminate it from objects of everyday use; for men think they can enforce improvements abruptly. No, this is not the way to achieve. Craftsmanship is essential as an enlightening power. Its mission is to impart finesse to trivialities and to teach men how to reason.

DISCUSSION

THE CHAIRMAN: This is the Peter Le Neve Foster lecture which was established in 1938 as a memorial to Peter Le Neve Foster, who was Secretary of this Society from 1853 until his death in 1879. The family connection with the Society goes back even further, for it was in 1761 that the grandfather of that Peter Le Neve Foster joined the Society and one of his descendants is with us this afternoon. That I think is an interesting point.

This is the tenth and last of a series of lectures on craftsmanship which have been

delivered by a number of very well-qualified speakers in this hall of the Royal Society of Arts. I think the Royal Society of Arts has done good work at this stage of development in bringing these lecturers together and getting them to talk to us about different crafts. I have not been able to come to all of them—I wish I had—but I have read them all. I was particularly interested in the one delivered by an old friend of mine, Bernard Leach, who in his workshop at St. Ives has got a group of craftsmen together working as a body in an interesting way. That is a development which may become much more general in the country.

It is a very pleasing thing for the Chairman to say that he agrees with the lecturer on at least one point. There is one point where I do agree with the interesting and stimulating lecture we have heard to-day and that is that it is a frightful thing that there are only four masons in Cambridge. I speak there with feeling because I know something about the handling of stone, and I think it is an important point. I feel over this problem that it is very easy to take a pessimistic view of the situation and I think the speaker was being rather gloomy in his approach. Looking round to-day I think we could find many things which would lead us to take a very pessimistic view, but it is the job of our generation to reconcile the work of the machine with the work of the hand, and we have to find a way of doing it. We have got to do that; there is no way out and there is no short cut. We cannot, as Morris suggested, go back to hand-work. What he would have thought of the idea that the Gothic style was an attenuation of the Classical I will not suggest! I think his remarks would probably be picturesque! But we have got to find a way out of this maze. We are in a maze and I believe that there is a way out. I think that this problem is really bound up within the question of good workmanship. We have to find some way of getting back to first-rate workmanship, whether by machine or by hand. Shoddy workmanship is never worth looking at. I was interested in what Professor Richardson said about shipyards, because going over John Brown's yard not long ago, I was astonished to find that things like turbine blades had to be fitted individually by hand. There are thousands of them and there is no other way of doing it. It is a very tricky job. So we cannot separate hand and machine workmanship, neither do we get over the problem by throwing bricks at one another. All people interested in hand work and machine work must find some way of realising that these are complementary methods of making goods. If you want a small number you make them by hand but if you want a great number you make them by machine.

No country has reconciled those two methods of production. Scandinavia has made some progress in that direction but their production by machine is so small that it is not on a mass-production scale. I think that we in this country stand a better chance of reconciling those two very different methods of production than anybody else. The Americans will not do it. Their idea is to get things done quickly; whether they are to be done well is not so important. Unfortunately there is a tendency to-day for us to go down the American road which I do not think is our road at all. I think ours is the road of high quality and I think we ought to keep on it.

If we can do this we must realise that it is something which no one else has done at all. It is a completely new thing to try to do. I am not quite sure what is the exact difference between needlework and stitchery, but I do not believe that it will be by putting women back to needlework, even if this were possible, that we shall resolve this problem. I think we must solve it by some other means. Of course, I am all for embroidery, but this is a job which will need everybody including the most intelligent women we have got. I think it was Sanderson of Oundle who said that the first product of industry is the worker. What sort of workers are we producing by our methods to-day? That is really more important than the goods we are producing because it is the standard of people that counts, and that will be shown quite clearly in the sort of goods they produce. You can look at the results of any civilisation and give a pretty good guess as to the general feeling of what was worth doing and what was not. If you walk along the Strand you will find that you would be rather embarrassed to have to explain it to someone 2,000 years ahead.

In agriculture we have heard about the trace element. At one time we were told that artificial manure would solve all our problems and I think that is rather like the problem we have in industry. It has been discovered that there are trace elements which, even if only present in quantities of one in ten million, are absolutely essential for the growth of plants, and I think that craftsmanship is an element of that kind in industry. If we lose touch with absolutely first-rate workmanship something goes out of machine industry which cannot be replaced in any other way. I think that is an extremely important thing to remember. In the past we had hand workmanship done by men who were not thinking of saving a quarter of a farthing. Those men were thinking of the real quality of the object produced. If it took an extra quarter of an hour, half-hour or hour, that was that, but it was the quality of the thing that mattered to them, and that I think is the essential thing that craftsmanship has to teach us in industry. Before everything else, first-rate craftsmanship teaches us the necessity for a very high standard, come what may.

I should like to thank Professor Richardson for coming here to-day and giving us this extremely stimulating and interesting talk and, in proposing this vote of thanks to him, I would add how much I have enjoyed everything he has said, although I do not agree with all of it.

Sir HARRY LINDSAY: I very heartily second this vote of thanks. I knew we should get something good from Professor Richardson but how good I did not know until this afternoon, when I had a preview of his lecture and read it with the greatest pleasure and profit.

This series of lectures has been very successful; and we do owe much to Mr. Gordon Russell for having inspired and organised the series and for having found a winder-up who kept the balance true with Mr. Farleigh, who opened it and whom we are all glad to see here this afternoon.

Professor Richardson has said some extremely harsh things about the British public and their appreciation—or lack of appreciation—of arts and crafts. Most of the criticisms are thoroughly well deserved. At the same time I think there is one more reason, not mentioned by our lecturer, why we fail to appreciate what is best in the arts and crafts. Professor Richardson said that we were shy and self-conscious. In addition, we are mentally lazy, not to say apathetic. I do not think Professor Richardson mentioned that outstanding fault.

Professor RICHARDSON: No, but it is very true!

Sir HARRY LINDSAY: As it happens I know something about mental laziness because I have to keep in touch with the general public visiting the Imperial Institute's Exhibition Galleries, for which I am responsible; and I notice that there is a great capacity on the part of the general public to say "Oh," flicking on the light, "I like that" or "I don't like that". But the person who flicked on the light had not got an answer to my question: "Why do you like what you like?" You see, it is a mere impulsive and emotional reaction. Any mug can have an emotional reaction. We are so born that we do react emotionally to things, for one must remember that, as the lecturer very properly said, every human being is an artist in some form or another.

But, after all, human beings have not only emotional but reasoning faculties as well. There must be some reason why we like this and do not like that; and we can all go a little further and examine whether our reasons for liking this and rejecting that are right reasons—it is just possible that they may be thoroughly unsound reasons or may even be merely emotional reactions into which reason doesn't enter at all.

What is the corrective? Before I deal with that, may I tell you a little story which I hope you do not all know? It is the story of the three imps—a mediæval legend. You remember how Satan, after a bit, found that he was beginning to lose influence with the human race. He became perturbed about it and summoned his three best (or worst) imps to advise him. The first one said "I will go abroad among the human race and tell them that there is no God". The Devil thought that over and said "That is no good".

The second imp said "I will tell them that there is a God but that he is not a God of love", and Satan said "Well, we are getting nearer it, but I do not think we have yet got to what we are really after". The third imp said "I will tell them there is a God and that He is a God of love, but that it does not matter".

That is our trouble. The trouble is, as our lecturer so well knows, that when you are talking to adults on art subjects you are talking to people who are already either educated or uneducated in art matters; therefore I agree with him when he tells us how important it is to train the child in a competence not only to enjoy art but to know why he or she is enjoying it. At the Imperial Institute we use native arts and crafts a great deal to tell the story of tropical life in the Overseas Empire; and we find that the children who are brought round the Institute Galleries in school parties in term-time bring their own parents in the holidays. Our attendances are two or three times as great in the holidays as in term-time and we do feel that we reach the adult that way. We feel that if we can only tell our human stories of arts and crafts in the Galleries so simply, directly and forcibly that the child can understand them, then even the adult is sometimes able to grasp what we are after, too!

For those reasons I commend very heartily Professor Richardson's interesting and inspiring paper and I second this vote of thanks.

The vote of thanks was carried with acclamation.

Professor A. E. RICHARDSON: Both our Chairman and Sir Harry Lindsay have stressed the importance of balance. That, I think, is the most important fact that has come out of this talk. To-day balance is needed. I would remind you, too, that through the ages at every period there have never been more than a few contrivers, or craftsmen. The rest have been recipients. In ancient Greece it was the few who contrived and the whole nation appreciated. That is our position to-day. We cannot be a whole nation of craft workers, but we should have the taste and the culture to see that there is balance between things that are produced in mass and things that are rather special, because the special things will add quality to the mass. I think those are the points I had in mind to say.

The meeting then terminated.

R.D.I.s AND COMMERCIAL DESIGN

Even to-day, despite the lead given by the Government in the "Britain Can Make It" Exhibition and the setting up of the Council for Industrial Design, lack of appreciation of the need for fine design prevails amongst the vast majority of manufacturers in this country.

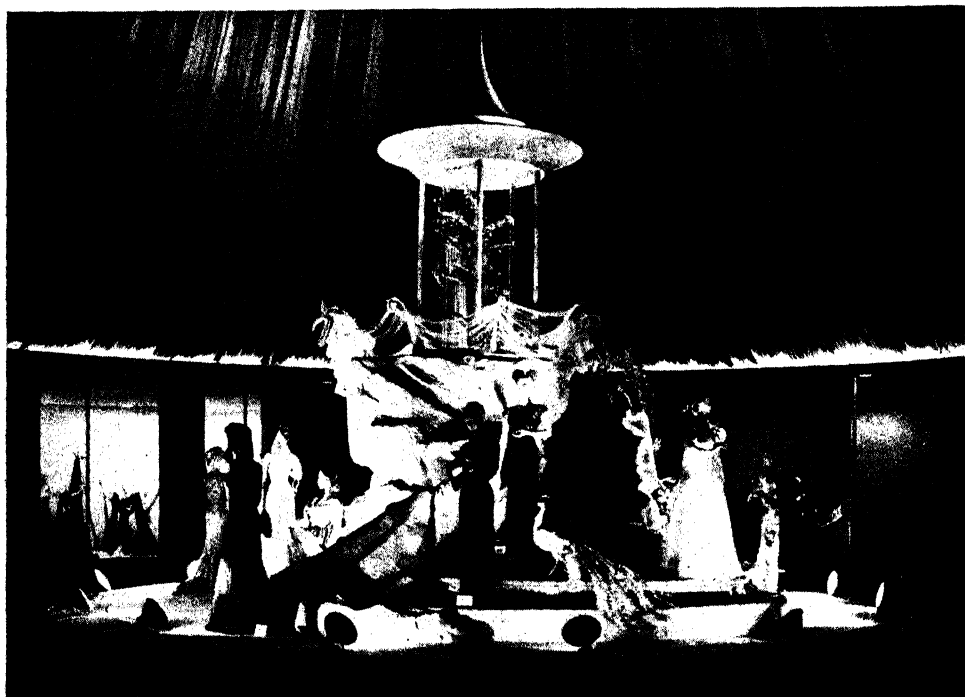
This is perhaps less noticeable in the field of commercial design than industrial. There is, after all, a tradition in this country stemming at least from the Beggar-staffs. Indeed, before the War the standard in Press advertising and exhibitions (some) and in posters was as high as any in the world and continually rising. There was a feeling of experiment and excitement in the air and this was translated in various ways from the traditional style of craftsmanship to the presentation in visual form of the latest and the most revolutionary ideas of the psychologists.

Some names, which were suitably honoured, became and have remained famous. To avoid discrimination, let us consider some of them in alphabetical order.

James Gardner, after a very varied career including the Chiswick and Westminster School of Art and the Regent Street Polytechnic, designing jewellery under the

guidance of M. Jacques Cartier, retouching photographs in Tunis and sketching in Italy, first became prominent as the designer of the Shell Exhibition "See How They Fly". After spending the war years on Army Camouflage, he then was chosen to be in charge of the design of layout and theme for the "Britain Can Make It" Exhibition. This has had many repercussions as well as an immediate and astonishing popular success.

Ashley Havinden of Crawford's Advertising Agency was a pioneer in the "chic" used in its best sense. During the pre-war years his work was to be seen throughout the country either as press layout, posters, carpet designs or as a painter pure, if not



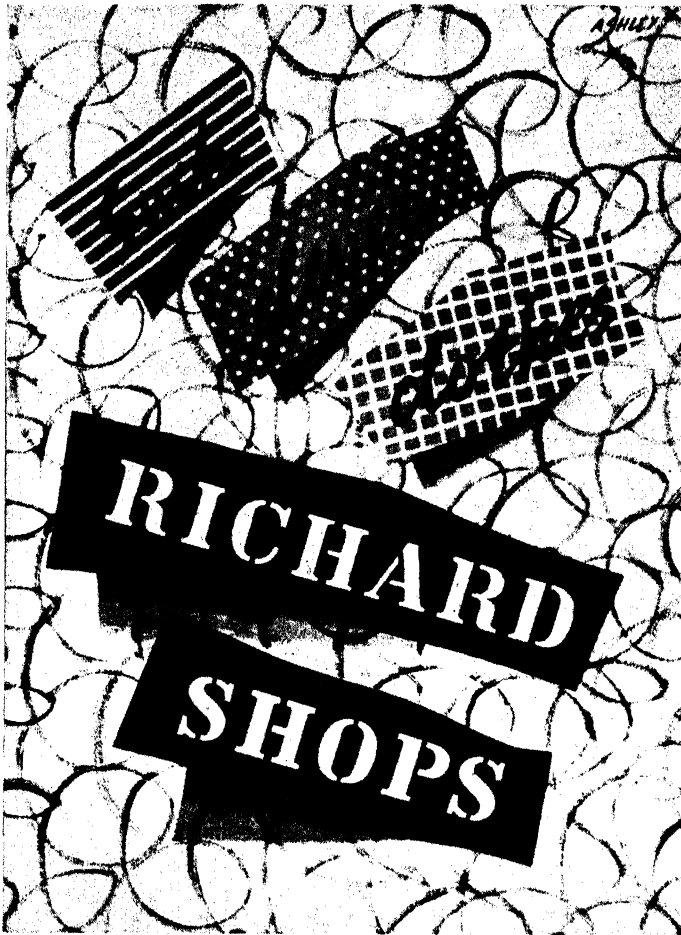
Women's Dress Section at the "Britain Can Make It" Exhibition, designed by James Gardner, O.B.E., R.D.I., M.S.I.A. In the centre is a revolving stage which rises to a height of 25 feet

simple. Probably he and McKnight Kauffer (now alas in the U.S.A.) had more influence on the younger generation of designers for publicity than any other of their contemporaries. Ashley (as he signs his work) has indeed probably done more to raise the æsthetic appearance of men's clothes than anybody since the eighteenth century.

Sir Francis Meynell not only took delight in and practised literature and journalism but also their proper presentation to readers. Twenty-five years ago he founded the Nonesuch Press, which for a long time produced what were perhaps the most beautiful books of their time in the world. He did not, however, confine himself to the rare atmosphere of the æsthetic, but constantly preached and wrote

on newspaper and advertising typography and unquestionably raised the general standard to a remarkable degree. Luckily for us all he is now honorary adviser on typography to H.M. Stationery Office.

Tom Purvis was one of the band of practical artists who studied the use of lithography for advertising purposes with enormous success. He did not paint a picture and hand it over to his client. He studied his clients' problem from a



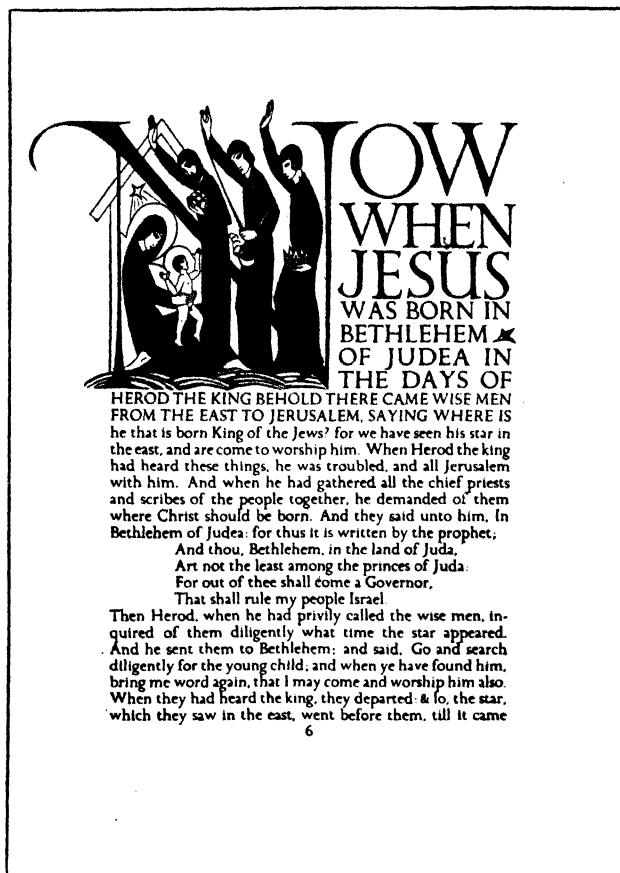
*Poster designed by Ashley Havinden, R.D.I., for Richard Shops.
It is a pleasant mixture of stencil and brush lettering*

commercial point of view and solved it with the greatest economy, both of design itself and use of colours. It was this gifted type of craftsmanship which distinguished his work over all others.

Fred Taylor after years of study and success as a water colour painter became more famous to the public in general by his long series of landscape and architectural

posters for the L.N.E.R. Here again, it was his skill as a craftsman in the use of lithographic processes allied to his taste as an artist which brought such widespread pleasure to so many different sections of society.

Percy Smith's work is less well known to the public but of no less importance in its influence on taste. Essentially a draughtsman and etcher he has advised both privately and officially many, many people on typography, lettering and illustration.



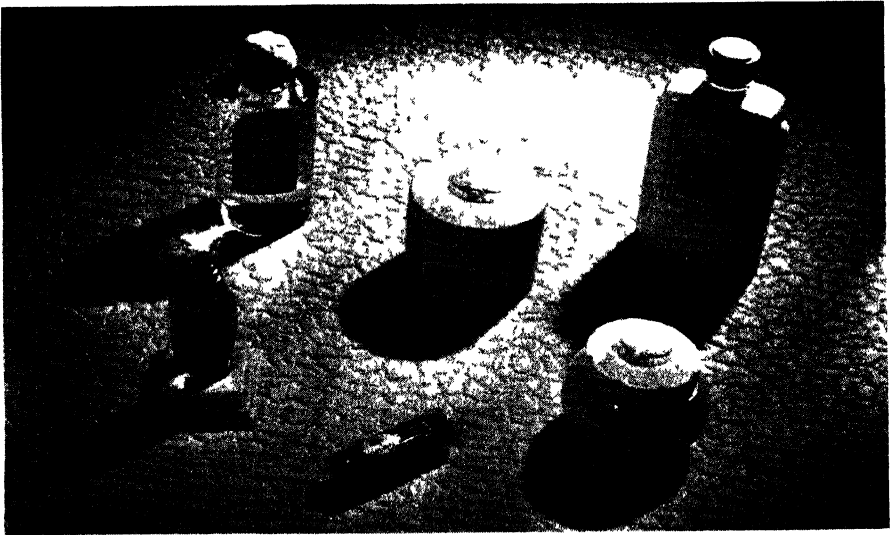
An opening from the Golden Cockerell Press "The Four Gospels", 1930. The wood-cut initial and the text type were specially designed by the late Eric Gill, R.D.I.

His inscriptional work can be seen on the Canadian War Memorial Vimy Ridge, and the R.I.B.A. headquarters. He has also published several books of etchings and dryprints and others on lettering and alphabets.

All these men have been honoured as R.D.I.s. Let us look forward to those who will join this famous band and hope that they will not all be men.

JACK BEDDINGTON.

*Pre-war design of Ceramic
Bottle and engraved offset
label by Milner Gray, R D I*



Examples of bottles and packs designed for Messrs Yardley by Reco Capey, R D I

OBITUARY

ALLAN WALTON.—By the death of Allan Walton, R.D.I., F.S.I.A., a very great number of people have lost a singularly modest, gay, sweet-tempered and staunch friend. The loss to all bodies who are endeavouring to improve standards of industrial design cannot yet be assessed. But that it will be a very severe one there is no doubt whatever. Walton's self-sacrificing character made it almost impossible for him to refuse help in a cause he had at heart. And, as his advice was always valuable, the calls were many. Indeed it is to be feared that overwork of this kind may have been responsible for bringing on the heart trouble. For his experience was exceptional. Firstly, he was an artist who maintained his interest in painting till the last. Secondly, his connection with his family firm in the textile industry gave him first-hand experience of the industrialist's point of view. Thirdly, his own textile designs, produced by the firm in the years before the war, were responsible to a considerable extent for improving standards. Fourthly, he was a teacher. His work as Principal of the Glasgow School of Art was not only successful in itself but gave him a wide knowledge of the educationist's problems in this particular sphere. Nor was his knowledge limited to Great Britain. He was keenly interested in what was happening abroad. But with all his specialist knowledge, Walton was no mere specialist. No one was more aware that living itself is an art, and the knowledge brought his many activities into harmony and gave him a breadth of outlook which made the petty schemes of little men seem small indeed.

He was elected a member of the Faculty of Royal Designers for Industry in 1940 and regularly attended meetings. He took the greatest interest in it and his sane and constructive criticism was of great value, especially in the initial stages. For Walton was peculiarly fitted to see how the Faculty could take its place in the grading up of standards of design as a whole: he had no wish to see it become an exclusive and complacent body. He was an original member of the Council of Industrial Design and also served for the first three years on its Scottish Committee with conspicuous success. Although he had a wider experience of industrial design problems than anyone on the Council, except perhaps Sir Francis Meynell, he never assumed that he knew all the answers and always listened with attention to other points of view. His obvious sincerity and fund of experience gave him the confidence of every other member and time and again his name came naturally to the lips of those present for a special job for which it was difficult to suggest an alternative nominee. It was the same with the Royal College of Art, the Society of Industrial Artists, the Design and Industries Association, and the Royal Society of Arts, of which he had been a member since 1935 and on whose Council he served for several years. He was not a rich man and much of this work was done at his own cost, always in his own time and the sheer physical effort of travelling must have been very considerable. But he made light of it and only occasionally he would say how nothing but a strong sense of duty would have brought him to a London meeting when he had had to leave a row of peas unplanted on a perfect day!

About two months ago when he last walked into the Arts Club—of which he was proud to have been elected a member at the age of nineteen—he had come from his specialist, who had told him he must rest for two months. But he was cheerful and happy: nor was there reason to be unduly worried about him. He was looking forward to taking up the Department of Textiles at the Royal College of Art under his old friend Robin Darwin. That he would have had a great contribution to make to the courageous experiment of reorganization is undeniable and when the small team meets in a few weeks' time to start a memorable term, there will not be a single one who will not feel deeply what a great privilege it would have been to have worked with him in a venture for which his life's experience fitted him in a quite exceptional way. G.R.

GENERAL NOTES

THE ROYAL PHOTOGRAPHIC SOCIETY'S EXHIBITION.—After studying the Photographic Exhibition of the Royal Photographic Society now on show at 16, Princes Gate, London, I must admit that I found it exceedingly difficult to select outstanding examples which in design and originality maintain such a high standard.

The most outstanding, in my opinion, being "The Holly and the Ivy", in colour, by W. C. Symon. It had a feeling of an old Dutch Master, both in conception and in the masterly handling of light and shade, which enhanced the beauty and dignity of the picture.

The stereoscopic pictures were breathtaking, one could hardly imagine that one was gazing at only a picture; the three-dimensional effect is almost unbelievable—the woods, the dales, and the hills in superb colour. I spent a most entrancing interval sitting gazing at a miracle in miniature!

Now to return to the black-and-white pictures. I thought the study of "Ave Maria", by Adolf Fassbender, was excellent both in setting and lighting. I really do feel that he deserves the warmest praise for the conception of the picture and the quiet, artistic way it is portrayed. With "Pirates Pool", by A. Pearlman, "Crater Lake", by E. G. Newhall, although they are entirely different in lighting and scene, I found it exceedingly difficult to decide which appealed most to me; both pictures are superb. Another black-and-white which could not be passed by without comment was "The Shadowed Down", by C. J. Unsworth. The entrancing flow of the line of the down held me not only because of the beauty (if only it had been in colour) of the line but one felt that here too was glorious serenity and peace, a solitude where one could "Lift up one's eyes unto the hills" and all that that implies. It had the same spiritual attraction for me as "Ave Maria". Another picture difficult to leave was "Summer Beauty", by Will Till, the peacefulness of the gently wooded landscape, the masterly handling of both light and depth of focus made for me an illustrated poem filled with a delicacy of beauty and truth.

The pictures of children, "O Joyous Heart" by A. de Mott, and "Twins" by T. Y. Young, I enjoyed as they were so natural and full of life. The photographic study of a little child by Marcus Adams had the dignity which one would expect from such a master of child portraiture. Another study I liked immensely was "The Veteran" by F. S. Schiffer. The dear old boy portrayed had the steady composure of Old England written all over him. The lighting was so simple and dignified, and in marked contrast to the disquieting light on the photographs of many film stars! The exhibit of the two ducklings entitled "Downey Duo" by Miss B. P. Henderson had an arresting appeal because of the beauty of the background.

As for photographic design "Silver Screen" by Mrs. K. M. Parsons, "Rhapsody in Glass" by R. F. Bungert, and "Ground Cedar" by Adolf Fassbender were admirable examples of what constructive thinking can do. One feels sure that industrialists making fabrics would welcome such photographic assistance as these studies of line and light portray.

HOWARD COSTER.

THE WORK OF THE ROYAL DESIGNERS FOR INDUSTRY.—The Design and Industries Association, London Region, announce that at a Luncheon Meeting to be held on Wednesday, 6th October, 1948, from 12.30 to 2.30 p.m., at the Royal Society, Burlington House, Piccadilly, Mr. Gordon Russell, C.B.E., M.C., R.D.I., will speak on "The Work of The Royal Designers for Industry". Mr. F. R. Yerbury, HON. A.R.I.B.A., will be in the Chair. A buffet lunch at a charge of 3s. 6d. can be provided if reserved beforehand by application to the Secretary of the Design and Industries Association, 9, Conduit Street, W.1.

NOTES ON BOOKS

SCIENCE AT WAR. By J. G. Crowther and R. Whiddington, C.B.E., F.R.S. His Majesty's Stationery Office. 2s. 6d.

In a Foreword to this book, Sir Henry Dale explains that security reasons have hitherto prevented accurate stories of the contributions of science to recent warfare being made public, while at the same time these contributions are so immense and varied that there is some difficulty in presenting them with a sense of balance. The book provides therefore

a sample of the principles on which scientific work and technical applications to operational needs were based. Although authoritative, having been passed through Service departments for security scrutiny, the writing is anything but dull. Much of the information is new and corrects many speculations; it is presented with dignity, implying that readers should not be content with the answers which scientists found for operational questions, but should realise that the hard thought that was brought to bear when required is inherent in all scientific work and is not merely called up by some genie on demand.

We have therefore here official stories of the development of the detection and navigational devices classed under radar; the account of the magnetic mine, and the means adopted for its defeat, with many other aspects of the war at sea; and a concise statement of the features of the atomic bomb. These are straightforward stories and they frequently indicate that dangerous development work was undertaken by all classes of persons, at short notice and at high speed. What is particularly important for the general reader is the section on Operational Research, because it is new and spectacular in many of its results.

Operational research is new in the sense that nothing like it was available previous to the recent war; indeed, it grew up almost accidentally when, given a few problems to work out, some pioneering scientists showed that their methods of work and predictions became of unanticipated value. Quoting the text, "It is found that experienced executive judgment in many professions is most likely to go wrong when quantitative analysis requires the application of the theory of probability". It was found that biologists had derived for themselves a special analytical technique which enabled them to discover the effect of individual variables when many are present together. To the ordinary mind many calculations based on probability are often apparently in conflict with so-called common sense. Science, however, is merely highly organised common sense, based on observations, the probable accuracy of which is determined as part of the experimentation and is inherent in the results. In warlike operations these inaccuracies expand and must include human errors arising under stress, but the tangled data became amenable to the developing technique of operational research and this showed how both men, materials, and time could be used most efficiently.

Operational research is comparatively novel in applied science and its principles no doubt can be applied to complicated problems of peace-time. As presented it is comparatively easy to understand. The technique is, however, concealed and the amateur organiser and planner is warned that operational research is not quite so easy as appears on the surface and it demands a very high standard of scientific discipline. The war-time scientists did in fact correctly predict that one bomber would be lost through collision in the first 1,000-bomber raid, but we must always remember that the probability of anything happening always includes the possibility of a coincidence, but if a coincidence does occur the calculated probability is not thereby changed. L. E. C. HUGHES.

MODERN FOREIGN CHURCHES. E. Maufe. Incorporated Church Building Society. 1948. 5s. 6d.

This is an interesting collection of pictures of continental church work of the latest pre-war period with concise and sympathetic descriptions by a contemporary British architect.

Besides the illustrations and the appreciation and the by no means fulsome descriptions, the book contains half a dozen pages of letterpress concerning modern churches in general which deserve to be read, marked and inwardly digested both on account of its balanced outlook towards the future and of its appreciation of what has been accomplished in the past, even by the despised Victorians. The general character of the book itself is very sensible and unpretentious. The illustrations, two to a page $8\frac{1}{2} \times 5\frac{1}{2}$ inches, are quite sufficient for their purpose and a welcome relief from the large and dull photographic plates, often of very trivial objects, with which many modern architectural

books are overburdened. The writing too is clear and concise and the price of the book is extremely modest.

The churches illustrated are many of them on a much larger scale than those we build in England and it is difficult to appreciate their merits without knowing something about their surroundings and special requirements. Some of the Swedish and German examples, though not all, have been obviously designed to look at home in Sweden or Germany. A Danish example would certainly not look at home anywhere but in Denmark and at least one of the Italian churches, of which only an exterior view is given, would look quite natural in a Lombardy town if it were more dilapidated.

Probably the best compromise between modernism and tradition that is shown in the book is the Hogalid church at Stockholm, obviously suggestive of the Stockholm Town Hall. The interior seems hardly worthy of the very fine external lines, there are too many pews and the absence of high light, judging from the photograph, seems somewhat depressing, but the scale and general proportions are remarkably fine and the details simple and good.

There is a strong family likeness among the towers illustrated—Austria, Finland, Germany and Switzerland appear to like a tall, rectangular campanile terminary with a belfry stage with a series of pigeon-hole windows on all sides, not by any means ineffective but apt to be wearisome if repeated too often.

A great deal depends on the surroundings of these churches, some of the buildings such as that at Gerliswil (Switzerland) a perfectly plain rectangular block with an equally plain "pigeon-hole" tower at one corner would look entirely in place either on a mountain side or in a tropical settlement. A church at Budapest would look admirable on the banks of the Nile, and has an imposing and very suggestive reinforced concrete interior for the sake of which any external incongruity may be forgiven.

A church at Helsinki is very Italian indeed and possesses a very unconstructional cruciform west window, a sad lapse from the functional logic of the rest of the design, and from the very severe-looking communion rail enclosing the altar.

There is an attractive modernist church at Karlsruhe with a rather Italian exterior and a pretty octagonal tower and there are one or two examples of Gothic expressed in reinforced concrete which have a family likeness in that the arches spring from the pavement in a rather effective way, though, as in the case of the pigeon-hole belfries previously referred to, it is likely that this particular form of Gothic design would not bear much repetition.

The last two illustrations are from the United States, one an example of revived "Colonial" architecture, the other very very "modern" indeed.

And among the advertisements at the end of the book is one which shows the new Lady Chapel at Donai Abbey, Berks.

So the reader may make up his mind as to whether he wished the Modern Foreign Churches were not foreign or was thankful that they were.

CHARLES A. NICHOLSON.

JAN VERMEER VAN DELFT. By A. B. De Vries. Batsford, 1948. Price 42s.

This study of Vermeer by a young Dutch critic was originally published in Holland in 1939. It was followed by a revised edition in German in the last year of the war; and now, translated by Mr. Robert Allen and with Batsford's imprint, appears the latest English edition "embodying the results of recent research".

What a delicious understatement is that discreet bibliographic note "embodying the results of recent research"! "It was not till after the war", Mr. De Vries candidly admits, "that this astounding case of forgery came to light and I was brought to my senses". Duped, as were so many other experts of international renown, by Van Meegeren's impudent and astonishingly successful forgeries, the author has reviewed Vermeer's entire *oeuvre* and in a new appendix gives us a list of ancient pictures which, in his opinion, can no longer be safely attributed to the artist, several paintings of doubtful authorship, and the deliberate falsifications. "Once caught, twice shy", might be the

irreverent sub-title of this Appendix "On some erroneous or disputed Attributions and certain Falsifications"—which incidentally makes the preceding sixty pages on the painter's life, influences, and output seem the tamest reading by contrast.

Hardly less remarkable than this expert's disarming candour is the fact that the publishers offer no hint of these pages in the dust-cover's "blurb", though it is certain that they will be studied with profound interest not only by connoisseurs but by ordinary readers who have been stirred by one of the most sensational episodes in the history of art—an episode which, the author suggests, could have taken place only in the exceptional circumstances of the occupation.

The first sixty pages, as I have suggested, fulfil but hardly exceed the expectations aroused by the reputation of a discerning critic of the Dutch School. Little is known about Vermeer's methods of work, though we know that he worked very slowly. Still less is known of his personality, and such details as we have of his life are scanty in the extreme. Like Rembrandt he was frequently in debt, and was at one time constrained to work as an art dealer in an attempt to make a living for his family.

From such gleanings, and an attentive study of his paintings, the author conjures up an imaginative portrait of the artist comparable only with Max Beerbohm's inspired picture of the Clergyman of whom all that is known is that he was once, in conversation, rebuked by Dr. Johnson. "I imagine Vermeer silent and reserved; his youthful vitality sapped, perhaps by ill health, while he was still in his prime. Earnestness, self-control and a tendency to melancholy, are the traits I see in him . . ."

Well, that may be so. But what is assuredly beyond question is that Vermeer's realistic canvases—those wonderfully observed interiors which reflect the play of light and shadow—are works of consummate achievement. Even if he tended to repeat his *motifs*, the pure, mellow colour and robust brushwork (to mention but two characteristics) sufficiently reward the student of his painting.

We can only marvel then that a disciple could so faithfully reflect the master's style and spirit as to produce not a copy, nor even a version, but a purely creative forgery in the "Supper at Emmaus"—a subject Vermeer never attempted—and confound the foremost critics in the world until circumstances, quite unrelated to this canvas, brought the imitator before the courts.

REMBRANDT PAINTINGS. Introduction by Thomas Bodkin. Collins. 30s.

I remember one evening at the Athenæum asking Professor Bodkin the history of a certain painting by Raphael of which I knew several versions existed. Without hesitation he traced the movements of the particular panel I had in mind which, I recall, was eventually acquired from the Hermitage by Mellon and bequeathed to Washington. Shortly afterwards he wrote to confirm the details from the University of Birmingham where, as everyone knows, he is the distinguished Barber Professor of Fine Arts.

I recall the story as an example of the encyclopædic knowledge of our foremost authority on the Old Masters who knows, probably better than anyone else in this country, the history and condition of the masterpieces of European painting. Of Rembrandt, in particular, he has a profound knowledge, and his enthusiasm is boundless for the man "dedicated", as he says, "and set apart by Providence to be a painter". The publishers of the Apollo Edition did wisely to invite him to contribute the essay on the painter and his art which prefaces a hundred full-page reproductions of Rembrandt's paintings—twenty of them in colour—selected by Professor W. Martin, former Director of the Royal Gallery at the Hague.

A prodigal spender, incapable of looking after his affairs and absorbed only in his art, Rembrandt died in absolute poverty at the age of sixty-three, leaving to posterity more than six hundred and fifty oil paintings, besides a vast number of drawings and several hundred etchings.

Tintoretto and Caravaggio were early and enduring influences in his career, and from the outset we observe his astonishing dramatic power and passionate interest in the effects of *chiaroscuro*. As a portraitist he is unsurpassed in his feeling for character, and the

acute observation of his single figures and group-portraits is apparent also in his landscapes in oils—of which "A landscape with a stone bridge", reproduced in colour, is a superb example—and innumerable etched plates.

Professor Bodkin dwells especially on his greatest works—"The Return of the Prodigal Son", "The Syndics", "The Night Watch", and the extraordinary *tour de force*, painted in his twenties, which established his reputation. "The Anatomy Lesson"—in a paper which is a model of lucid scholarship. It is justly claimed of the book that it is addressed not primarily to the expert, but to all lovers of good painting.

N. A. D. W.

LIST OF PERIODICALS RECEIVED IN THE LIBRARY OF THE SOCIETY

This list is arranged alphabetically under broad subject headings. It contains all periodicals which are now received regularly in the Library, but year-books, annual reports and small leaflets are excluded. Frequency of publication is indicated as follows: W—weekly, F—fortnightly, M—monthly, Alt. M—alternate months, Q—quarterly, $\frac{1}{2}$ Y—half-yearly, A—annually.

The place of publication is London, unless otherwise stated in the title or in brackets.

Periodicals marked with an asterisk are retained permanently in the Library.

All periodicals are kept for reference purposes in the Library and cannot normally be borrowed.

GENERAL (including museums and libraries)

- | | |
|-----------------------------------|-------------------------------|
| Aslib Information [M] | *Museums Journal [M] |
| B.B.C. Quarterly [Q] | News Review [W] |
| John Rylands Library, Manchester: | *Notes and Queries [F] |
| Bulletin [$\frac{1}{2}$ Y] | Public Opinion [W] |
| *Journal of Documentation [Q] | Spectator [W] |
| *Library Association Record [M] | Times [D] |
| Listener [W] | Times Literary Supplement [W] |
| Museum Service. Bulletin of the | |
| Rochester Museum of Arts and | |
| Sciences (Rochester, N.Y.) [M] | |

SOCIAL SCIENCES (including education, economics, trade and commerce, and transport)

- | | |
|---|---|
| A.M.A. Journal of Incorporated Association of Assistant Masters [M] | London Corn Circular [W] |
| Chamber of Commerce Journal [M] | London Teacher and London Schools Review [M] |
| Chartered Auctioneers and Estate Agents Institute: Journal [M] | Railway Gazette [W] |
| Foreign Commerce Weekly (Washington) [W] | *Royal Statistical Society: Journal [Q] |
| Indian Trade Bulletin (New Delhi) [M] | School Government Chronicle and Education Review [M] |
| Institute of Bankers: Journal [Q] | Seafarer. Journal of the Seafarers' Education Service [Q] |
| Institute of Navigation: Journal [Q] | Signal. Organ of the Radio Officers' Union [M] |
| Institute of Transport: Journal [Alt. M] | Times Educational Supplement [W] |
| Life-Boat [Q] | |

SCIENCE

- | | |
|---|--|
| Academy of Natural Sciences, Philadelphia: Proceedings [A] | *American Philosophical Society: Proceedings (Philadelphia) [Alt. M] |
| *American Chemical Society: Journal (Cambridge, Mass.) [M] | Analyst. Journal of Society of Public Analysts [M] |
| American Leather Chemists' Association: Journal (Easton, Pa.) [M] | British Abstracts [M] |
| | British Chemical Digest [M] |

SCIENCE continued

- British Interplanetary Society: Journal [Alt. M]
 British Scientific Instruments Research Association: Bulletin [M]
 Chemical, Metallurgical and Mining Society of South Africa: Journal (Jo'burg) [M]
 *Chemical Society: Journal [M]
 Chemist and Druggist [W]
 Chemistry and Industry [W]
 Chimie et Industrie (Paris) [M]
 Council for Scientific and Industrial Research: Journal (Melbourne) [M]
 *Current Science (Bangalore) [M]
 *Franklin Institute: Journal (Lancaster, Pa.) [M]
 *Geological Society of London: Quarterly Journal [Q]
 Geologists' Association: Proceedings (Colchester) [Q]
 Kew Bulletin [$\frac{1}{2}$ Y]
 *Linnean Society of London: Journal [A]
 *Linnean Society of London: Proceedings [Q]
 *Manchester Literary and Philosophical Society: Memoirs and Proceedings [A]
 National Academy of Sciences of U.S.A.: Proceedings (Easton, Pa.) [M]
 *Nature [W]
 Nova Scotia Institute of Science: Proceedings (Halifax) [A]
 Philips Research Reports (Eindhoven) [Alt. M]
 *Physical Society: Proceedings [M]
 *Research [M]
 Royal Canadian Institute: Proceedings (Toronto) [A]
 *Royal Dublin Society: Scientific Proceedings [Q]
 Royal Institute of Chemistry: Journal and Proceedings [Alt. M]
 *Royal Institution of Great Britain: Proceedings [$\frac{1}{2}$ Y]
 Royal Meteorological Society: Quarterly Journal [Q]
 *Royal Philosophical Society of Glasgow: Proceedings [A]
 Royal Society of Edinburgh: Proceedings [A]
 Royal Society of New South Wales: Journal and Proceedings (Sydney) [Q]
 *Science Abstracts. A—Physics; B—Electrical Engineering [M]
 Science Club: Journal (Calcutta) [Q]
 *Science Progress [Q]
 *Scientific American (New York) [M]
 *Smithsonian Institution: Report (Washington) [A]
 *Society of Chemical Industry: Journal [M]
 Victoria Institute: Journal of Transactions [A]

USEFUL ARTS (*including medicine, engineering, agriculture, business, industry and manufactures*)

- Accountant [W]
 Accountant's Journal [M]
 Agricultural Gazette of New South Wales (Sydney) [M]
 Agricultural Research: Journal (Washington) [F]
 *Agriculture. Journal of the Ministry of Agriculture [M]
 Airports and Air Transportation [M]
 Air Treatment Engineer [M]
 Aluminium Courier [Q]
 American Institute of Electrical Engineers: Transactions (New York) [M]
 Automobile Engineers Institution Journal [M]
 BEAMA. Journal for the British Electrical Industry [M]
 Brewers' Journal [M]
 British Dental Journal [F]
 British Journal of Radiology [M]
 British Medical Journal [W]
 *British Plastics [M]
 British Steelmaker [M]
 Cabinet Maker [W]
 Cement, Lime and Gravel [M]
 Civil Engineers of Ireland: Transactions (Dublin) [A]
 *Civil Engineers' Review [M]
 Claycraft [M]
 Combustion Engineering and Power Review [M]
 Consulting Engineer [M]
 Contract Journal and Specification Record [W]
 D.S.I.R. Building Science Abstracts [M]
 Dock and Harbour Authority [M]
 Dyer, Textile Printer, Bleacher and Finisher [F]

USEFUL ARTS (*including medicine, engineering, agriculture, business, industry, and manufactures*) continued

- Electrical Review [M]
 Electrical Supervisor [M]
 Engineer [W]
 Engineering [W]
 Engineering Journal (Montreal) [M]
 Engineers' Guild: Journal [Q]
 Farmers' Club: Journal [M]
 Farm Implement and Machinery Review (Woodford Green) [M]
 Fuel Abstracts [M]
 Gardeners' Chronicle [W]
 Hawker Siddeley Review [Q]
 *Horological Journal [M]
 *Imperial Institute: Bulletin [Q]
 Index Aeronauticus [M]
 *India Society of Engineers: Journal (Calcutta) [M]
 *Indian Engineering (Calcutta) [M]
 *Indian Farming (Delhi) [M]
 Indian Journal of Agricultural Science (Delhi) [Alt. M]
 Industrial Furnisher [Alt. M]
 Industrial Welfare [M]
 Industry [M]
 Institute Bulletin [M]
 Institute of Fuel: Journal [M]
 Institute of Marine Engineers: Transactions [M]
 Institute of Metals: Journal and Metallurgical Abstracts [M]
 Institute of Navigation: Journal [Q]
 Institute of Petroleum: Journal [M]
 Institute of Petroleum Review [M]
 Institute of Refrigeration Proceedings [A]
 Institution of Automobile Engineers: Proceedings [A]
 *Institution of Civil Engineers: Journal [M]
 Institution of Civil Engineers of Ireland: Bulletin [Q]
 Institution of Civil Engineers of Ireland: Transactions (Dublin) [A]
 *Institution of Electrical Engineers: Journal [M]
 Institution of Engineers-in-Charge: Transactions [M]
 Institution of Gas Engineers: Transactions [A]
 Institution of Mechanical Engineers: Journal [M]
 Institution of Naval Architects: Transactions [A]
 Institution of Sanitary Engineers: Journal [Q]
 International Sugar Journal [M]
 Iron and Steel Institute: Journal [M]
 Junior Institution of Engineers: Journal [M]
 Leather World [W]
 Light and Lighting [M]
 Liverpool Engineering Society: Bulletin [M]
 Liverpool Engineering Society: Transactions [A]
 Machinery Market [W]
 Machinist [W]
 Mechanics [W]
 Medical Press [M]
 Mining Magazine [M]
 Mining World [W]
 Modern Refrigeration [M]
 National Union of Manufacturers Journal [M]
 Naval Engineering Review [Q]
 Norges Utenrikshandel (Oslo) [F]
 North-East Coast Institution of Engineers and Shipbuilders: Transactions [A]
 Overseas Engineer [M]
 Packaging Review (Manchester) [M]
 Petroleum Times [F]
 Pharmaceutical Journal [W]
 Philips Technical Review (Eindhoven) [M]
 Power Farmer (Dublin) [M]
 Process Engravers' Monthly [M]
 Propriété Industrielle (Berne) [M]
 Rayon Textile Monthly (New York) [M]
 Refractories' Journal [M]
 Registered Accountant [Alt. M]
 Reinforced Concrete Review [M]
 *Royal Aeronautical Society: Journal [M]
 *Royal Agricultural Society: Journal [A]
 *Royal Horticultural Society: Journal [M]
 *Royal Sanitary Institute: Journal [Alt. M]
 Sanitation and Public Health [M]
 *Scope. Magazine for Industry [M]
 Secretary [Alt. M]
 Société Française des Électriciens: Bulletin (Paris) [M]
 Société des Ingénieurs Civils de France: Bulletin (Paris) [M]

USEFUL ARTS (*including medicine, engineering, agriculture, business, industry, and manufactures*) continued

- *Society of Dyers and Colourists: Journal [M]
- Society of Engineers: Journal [Q]
- South Wales Institute of Engineers: Proceedings (Cardiff) [$\frac{1}{2}$ Y]
- *Textile Institute: Journal (Manchester) [M]
- Textile Manufacturer (Manchester) [M]
- Textile Recorder (Manchester) [M]
- Times Industry Review [M]
- Times Trade and Engineering Supplement [M]
- Tractor Users Association: Journal [M]
- Travers' Circular [F]
- Tropical Agriculture (Trinidad) [Q]
- Water and Water Engineering [M]
- Wireless Engineer [M]

FINE ARTS

- Amateur Photographer [W]
- Architectural Association Journal [M]
- *Architectural Review [M]
- Architecture Illustrated (Stroud) [M]
- *Art et Industrie (Paris) [Alt. M]
- *Art and Industry [M]
- Arts Council Bulletin [M]
- British Journal Photographic Almanac [A]
- British Journal of Photography [W]
- British Kinematography. Journal of British Kinematograph Society [M]
- British Society of Master Glass-Painters: Journal [A]
- Cine Technician [M]
- *Dansk Kunsthåndværk (Copenhagen) [M]
- *Display, Design and Presentation [M]
- *Domus (Milan) [M]
- *Form. Svenska Slöjdföreningens Tidskrift (Stockholm) [M]
- *Graphis. International Journal for Graphic and Applied Art (Zurich) [Alt. M]
- *Industrial Design Abstracts
- Master Builder [M]
- New House [M]
- Official Architect and Planning Review [M]
- *Photographic Journal. Official Organ of Royal Photographic Society [M]
- *Royal Institute of British Architects: Journal [M]
- *Royal Institute of British Architects: Library Bulletin [Q]
- *Society of Industrial Artists: Journal [Alt. M]
- Spanish Cultural Index (Madrid) [M]
- *Studio [M]

GEOGRAPHY AND HISTORY (*including archaeology and world affairs*)

- *African Affairs. Journal of the Royal African Society [Q]
- *Antiquaries Journal. Journal of Society of Antiquaries of London [Q]
- *Archaeologia, or Miscellaneous Tracts relating to Antiquity [A]
- *Asiatic Review [Q]
- Britain To-day [M]
- Bulletin. Issued by the Egyptian Education Bureau
- Canada's Weekly [W]
- *Canadian Geographical Journal (Ottawa) [M]
- Ceylon News (Colombo) [W]
- Colonial Parliamentary Bulletin [M]
- Colonial Review [Q]
- Eastern World [M]
- *Geographical Journal. Published by the Royal Geographical Society [M]
- *Geographical Review. Published by the American Geographical Society (New York) [Q]
- Great Britain and the East [M]
- *Hindustan Review (Patna) [M]
- Historic Society of Lancashire and Cheshire: Transactions [A]
- Indian Information (New Delhi) [M]
- London Society: Journal [Q]
- Manchester Geographical Society: Journal [A]
- Modern Review (Calcutta) [M]
- *Royal Asiatic Society: Journal [Q]
- Scottish Geographical Magazine. Royal Scottish Geographical Society (Edinburgh) [Q]
- Ulster Commentary [M]
- *United Empire. Journal of the Royal Empire Society [M]

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4779

FRIDAY, OCTOBER 8, 1948

VOL. xcvi

PROSPECTUS OF THE SOCIETY

Many Fellows of the Society, especially those of fairly long standing, may not be aware that for some years there has been in existence an illustrated booklet giving a short account of the Society's history and setting forth concisely its aims and objects. This prospectus has recently been brought up to date, and it is felt that those Fellows who have not seen it may like to possess a copy not only for their own reference but also to pass on to friends who express an interest in the Society's activities.

The Secretary will, therefore, be pleased to send a copy, or copies, of the booklet to Fellows who apply for it. There is no charge.

"DESIGN AT WORK" EXHIBITION

PRESS LUNCHEON

The Chairmen of the Council of the Royal Society of Arts and of the Council of Industrial Design and the Master of the Faculty of Royal Designers for Industry gave a luncheon on Friday, 24th September, to representatives of the national daily Press, in order to launch the R.D.I. Exhibition, "Design at Work", which opens at Burlington House on October 26th. The guest of honour was The Rt. Hon. Mr. Herbert Morrison, P.C., M.P., The Lord President of the Council.

Sir Harry Lindsay, in proposing the Toast of The Lord President, described the various exhibitions which had been organised by the Society prior to the Great Exhibition of 1851.

The Lord President then replied as follows:

"I hope the 'Design at Work' Exhibition will bring out clearly and convincingly the close relationship there should be between production and design, and the great possibilities and advantages from their union.

"We shall have examples to show how by bringing the designer into productive industry at the right stage and early enough, and teaming him up with production and sales managers, research engineers and skilled craftsmen, goods are being turned out which are enhancing this country's reputation in overseas markets and which our own people at home are proud to own and can buy with a feeling of money well spent.

"Good design is not a luxury, but a vital element in the manufacturing process. It is, along with sound workmanship and competitive price, one of the essentials for trading success. Good design is an essential part of good quality. It has a specially important part to play in present circumstances because the difference between good and bad design makes no call upon extra imports of raw materials, no added demand for manpower, but is worth hard money to us in world markets.

"We have a vast wealth of new substances, new processes, new finishes, and new techniques. Too many of them are hidden away. Manufacturers must bring them into use not only in their own particular industry but in exchange with other industries. All this, together with the newer knowledge that is coming from our technical and scientific laboratories, must be made available to designers and to the other specialists in the production team.

"With the proper use of our designers, we are making and can make still more British products which are good to *look at*, good to *use*, and to *make*.

"Don't get into ruts. Look out for improvements. Listen to your public. Always be ready to modify, to change for the good.

"I would congratulate the Royal Society of Arts and the Council of Industrial Design, who are together sponsoring this exhibition of the work of the Faculty of Royal Designers for Industry.

"Both the sponsors have undertaken big responsibilities in connection with the 1951 Festival of Britain, in which I have much personal interest. It is appropriate to recall that the Royal Society for the Encouragement of Arts, Manufactures and Commerce, to give them their full title, were the originators of the Great Exhibition of 1851. They held, exactly one hundred years ago, the first of a series of small exhibitions which led up to 1851. So history is repeated. And we, no less than our grandfathers, can in our way and with our later methods and ideas, take our full share in the advancement of our country and all the good that she stands for in this troubled world."

After the Lord President's speech, Dr. R. S. Edwards, Chairman of the Council of Industrial Design, explained the interest his Council had in the Exhibition, and Mr. Gordon Russell, Master of the Faculty of R.D.I.s, described the work of the R.D.I.s themselves.

PRESS CONFERENCE

A Press Conference in connection with the Exhibition was held at the Society's House on Tuesday afternoon, September 28th. A large gathering of Press representatives attended the meeting, which was presided over by Sir Harry Lindsay, Chairman of the Council. General Lord Ismay, Chairman of the 1951 Festival of Britain, who had agreed to preside, was unfortunately unable to do so, owing to illness.

After welcoming the representatives and briefly explaining the objects of the Exhibition, the Chairman mentioned particularly the historical parallel of the Society's activities 100 years ago which led to the Great Exhibition of 1851. It was, he said, especially appropriate that the Royal Society of Arts should again draw attention to the importance of good design, through the efforts of the Royal Designers for Industry, and try to help the public and the manufacturer to appreciate the value of well-designed goods. The forthcoming Exhibition would be a curtain-raiser to the 1951 Festival of Britain and he hoped would assist in stimulating popular interest in the work of the industrial artist.

Mr. Gordon Russell, Master of the Faculty of R.D.I.s and Director of the Council of Industrial Design, spoke of the team-work which had been put into the organising of the Exhibition and of the need for maintaining close and lasting co-operation between manufacturer and designer. He was followed by Mr. Milner

Gray, R.D.I., Designer-in-Chief of the Exhibition, who gave an outline of the lay-out of the rooms to be used at Burlington House and described some of the actual exhibits which would be displayed.

A number of questions dealing with various points concerning the exhibits were asked by members of the audience and answered from the platform.

RECENT ADVANCES IN ANÆSTHESIA

By FRANKIS T. EVANS, M.B., B.S., D.A.

CANTOR LECTURES

Three Lectures Delivered April 12, 19, and 26, 1948

One hundred years ago! A hundred years, what an age—nay, aeon—of time it seems in childhood; but as one approaches the half-century much of the magic associated with one hundred years disappears; for fifty years ago seems but yesterday, and an old lady, herself within four years of her century, assured me that her own childhood seemed only as yesterday.

Let us glance at our lovely England of one hundred years ago. The railways had become established and were spreading rapidly, steam was ousting sail slowly, but how sadly surely. There were gas lamps in Westminster, and Queen Victoria had been reigning nearly eleven years. The future King Edward VII was some six years old, and the prevailing fashion was remarkably modern. The double-breasted waistcoat was the fashion, and trousers were not worn so full as in these days. One hundred years ago Sir Robert Peel had just been returned to office. The Duke of Wellington was also in the Government, and those almost present-day figures Mr. Disraeli and Mr. Gladstone both held minor office in the Government. Flogging was still an Army punishment. Tennyson and Robert Browning were writing poetry. It was in 1847 that reporters were excluded by law from witnessing the last hours of the condemned. The picture of Landseer's "Stag at Bay" (still to be seen I am told in the saloon bars) was exhibited at the Royal Academy.

During the latter part of this year, a soldier, Fred White, was court-martialled for striking a sergeant with a poker. He was sentenced to one hundred and fifty lashes, from which punishment he died. Such was the anger aroused in the minds and hearts of the public, that his death led to conditions being changed. A Lieutenant Hawkey was tried for murder, as a result of a duel in which he was involved at Gosport, and was found not guilty, to the delight of all.

These were the good old days, when beer *was* beer and gin a penny or so a quatern! However, there was another side to the "good old days".

Only those who could control their emotions, and who possessed a subtle dexterity and rapidity of movement, could ever hope to achieve surgical eminence. The surgeon's knife was to be considered only when all else failed, and constant pain drove the sufferer to agree to an operation.

Laudanum was well-nigh useless, and was dangerous, and alcohol uncertain. All that was left was prayer and straps, and the straps sufficed. What a grim tho-

what a grim world of agony and terror for all patients who entered the operating theatre. Such was the world until the advent of nitrous oxide and ether, used by Clarke, Wells and Morton. But I anticipate! It is well to return to the beginning of time. There must have been some form of primitive anæsthesia in the Stone Age, such as the padded mace or the simple knockout, for how would a man come back eight times to have a successful trephining operation? There is in the Wellcome Museum the skull from a Stone Age man found in New Ireland, who had had eight successful trephine operations performed (*i.e.*, boring a hole in the skull). This operation was performed to let the devils or obsessing entities escape!

It has been suggested that the Assyrians and Egyptians utilised compression of the carotids to produce temporary anæsthesia. According to Prosper Alpinus (1591)



FIG. 1.—“*And the Lord God caused a deep sleep to fall upon Adam, and he slept*”

the Egyptians used Indian hemp fumes. Indeed, the *Nepenthe* spoken of by Homer was said to be hemp. In Peru the surgeon chewed coca leaves and spat into the wound to obtain an anæsthetic effect.

MANDRAGORA

The mandrake is still to be found in the Mediterranean countries, and much has been written about this plant. It roughly resembles the human form, and it was said to shriek when uprooted. He who heard the shriek when uprooting the plant died. So collectors of mandragora used a dog attached by a string to do the uprooting! The plant was said to have magical properties and should be collected at the right time according to astrological calculation.

Dioscorides in the first century mentions the mandrake, and in the second century

the Chinese were using a wine "Ma Yao" for anæsthesia, but its composition is unknown.

Avicenna mentions a deeply unconscious state being necessary for certain operations, but how that state was attained is not clear.

In the Middle Ages there were the *spongia somnifera*, which are mentioned in the antidotary of Bamber, dating from the ninth century. The *spongia somnifera* were soaked with fluid containing various drugs. One recipe recommended a mixture of opium, mandrake, cicuta and hyoscyamus (Sigrist 1923).

It is interesting to note that Baur in 1927 tested a number of these recipes on animals, and she found that they were unsatisfactory and inadequate for the production of anæsthesia. Alcohol was used for centuries, and has quite useful anæsthetic properties of a sort, if you can get enough of it! The difficulty is to get



From Diebold Schilling's Swiss Chronicle, 1513.

FIG. 2.—Early use of alcoholic fumes for anæsthetic purposes in monastic hospital

enough into the patient to induce stupor. The stomach is apt to rebel, and vomiting prevents the ingestion of further quantities of alcohol. Alcohol has been used as an anæsthetic on an open mask within the last twenty years, and I myself once gave an anæsthetic of gas oxygen whisky. In actual fact, it worked very well.

HYPNOSIS

In 1779, Anton Mesmer published his book on hypnotism, and James Braid brought out his own work on this subject in 1843. Hypnotism for surgery was used by John Elliotson of University College Hospital in 1843, but such was the antagonism aroused that he had to resign his position at the hospital. Two years later, James Esdaile, a Scot, resident in Calcutta, started using hypnosis for operations with great success. In 1846 he published a report of two hundred and sixty-one painless operations under hypnosis, with a mortality rate of 5 per cent. He returned

to his native land, and tried his hypnosis on the Scots, but they proved a hard-headed unco-operative crowd, and his efforts were unsuccessful. Hypnosis has been used recently for childbirth with apparent success.

PIONEER OF MODERN ANÆSTHESIA

Joseph Priestley, the discoverer of oxygen (1774), also discovered nitrous oxide. Priestley was born in a Yorkshire farmhouse in 1733 and later became a Non-conformist preacher. He was appointed librarian to the Marquis of Lansdowne at Bowood, Calne, and held this post as literary companion to the family for eight years. It was here he carried out his investigations, collecting gases from water bubbles. He prepared oxygen by heating red oxide of mercury with a burning glass.

Priestley was a man of many parts, for he taught himself Chaldee, Syriac, French,



FIG. 3.—Anton Mesmer

German and Italian. Lord Shelburne gave him £150 per annum for life when he left his service in 1780. He then went to Birmingham as a Nonconformist minister and there encountered James Watt and Erasmus Darwin. While at Bowood he was visited by Benjamin Franklin and he eventually migrated to Northumberland, Pa., in 1794. He was a Fellow of the Royal Society, but possibly his sympathy with the French Revolution, and the fact that his chapel had been burnt by the mob, hastened his departure for fresh fields and pastures new.

Humphry Davy experimented with N_2O in 1799, and the apparatus for its manufacture was made for him by James Watt of steam-engine fame. Watt also supplied Beddoes with a similar apparatus. (Thomas Beddoes who was a Shropshire lad born at Shifnal, was a reader in chemistry at Oxford in 1788, where he took his D.M. In 1793 he founded the Pneumatic Institution at Clifton.) Davy noted that his headache and toothache, due to an erupting wisdom tooth, was relieved when he inhaled

the gas, and he suggested its possible use in surgery. He gave demonstrations of its use at the Pneumatic Institute at Clifton. Eventually, lecturing "Professors" popularised this gas, and the "Bright young things" of that day staged Nitrous Oxide parties and Ether frolics. There is a pamphlet still extant written by one John Scoffern in 1839, entitled "Chemistry No Mystery", on the front page of which is a cartoon by Cruikshank depicting one of these frolics. Scoffern tells of bladders of nitrous oxide passed along the audience for their delectation. Michael Faraday—a recipient of the Albert Medal and the father of electric light and electric power—did much work on the liquefaction of gases. He it was who noted the soporific effects of inhalations of sulphuric ether. He wrote in 1818 in the *Quarterly Journal of Science and the Arts* upon the effects of inhaling the vapour of sulphuric ether "when the vapour of sulphuric ether, mixed with common air is inhaled, it produces effects very similar to those occasioned by nitrous oxide". No one, however, took any serious notice of this. It required the voice crying in the wilderness, and it needed the sacrifice of the broken heart. Such was the situation twenty years after the turn of the century. Some years ago a photograph came into my possession of the old theatre "A" at St. Bartholomew's Hospital, and I showed it to my old chief, Sir Girdling Ball. He it was who pointed out to me the bar and ring which was still in position. He explained that ropes were attached to the ring to keep the patient in position while the surgeon cut for stone. The patient was held in position rather like a trussed chicken, while the surgeon made his incision between the patient's legs into the bladder. The operating theatre in those days was not the place of cathedral calm of to-day, but a chamber all too often resonant with screams and cries of suffering humanity.

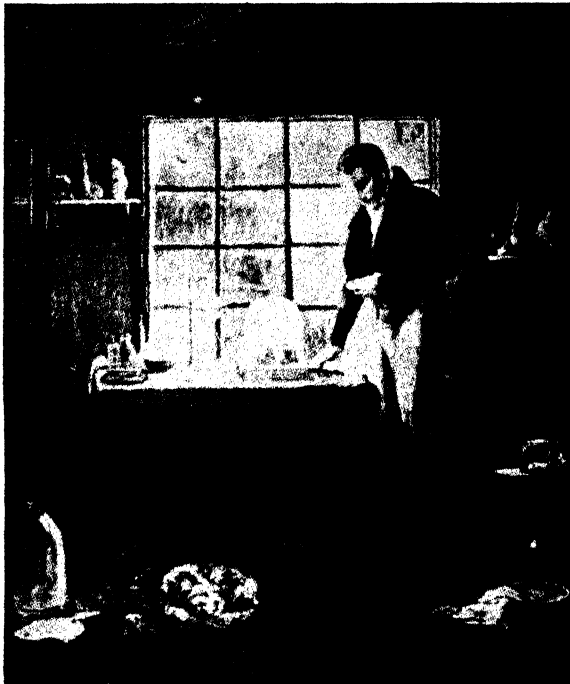
Samuel Pepys was cut for the stone by Thomas Hollier, who was renowned for his skill in this particular operation. Hollier, a surgeon at St. Thomas's Hospital, called in his chief, James Moleyns of Bart's. In the year 1658 Hollier cut thirty patients for the stone without a death, but shortly after he had four deaths occur in quick succession. How nearly we missed that Diary!

Moleyns prescribed a soothing draught of liquorice, marshmallow, cinnamon, milk, rose water, and the white of eggs. Not a very effective pre-medication. Hollier removed a stone the size of a tennis ball. For post-operative sedation poor Pepys received a drink of lemon juice and radish syrup (Arthur Bryant).

Into this world came Henry Hill Hickman, a real Shropshire lad, who has been described by Dr. E. A. Underwood of the Wellcome Medical Museum as "the Rupert Brooke of Anæsthesia". Hickman's was the voice and Hickman was the sacrifice. He was born in 1800 and qualified before the age of 21. He practised in Ludlow, Shifnal, and Tenby. The horrors of the operating theatre made a great impression on Hickman, and he set himself to find some way of alleviating the pain of surgery. He consequently experimented upon animals, and showed that they became unconscious and insensitive to pain when they breathed a high concentration of carbon dioxide. CO_2 is an anæsthetic, though not a satisfactory one. It was stated to me as a fact that, if a man fell into a fermenting vessel of beer, the poor fellow never came out alive. There is an atmosphere of pure carbon dioxide above the fermenting beer, and this causes rapid loss of consciousness.

Hickman recommended, too, that nitrous oxide be used, and it is said that he used

this gas in his animal experiments. He tried to interest scientists and the medical profession in this country in his "Suspended Animation," in which he envisaged respiratory arrest! His efforts were unavailing, so he next addressed himself to Charles X of France, who appointed a commission to examine his proposals. Unfortunately, the savants reported adversely and Hickman returned to England—sad and disappointed, to die-broken hearted at the early age of 30. The sacrifice was complete and the stage was now set and the curtain ready to go up on the next Act of the Drama. Hickman was buried in Ludlow, and his grave was recently renovated by the Anæsthetic Section of the Royal Society of Medicine, who now



From an oil painting in the Wellcome Historical Medical Museum. Courtesy of the Wellcome Foundation, Ltd.

FIG. 4.—Hickman experimenting with anæsthesia on animals

periodically award a Hickman medal to an anæsthetist whose services to anæsthesia are considered outstanding.

The story now takes a distinct dental note, for in January, 1842, William Clarke of Rochester, U.S.A., who had gained his experience and ideas at ether frolics, administered ether to a Miss Hobbie when she had a tooth removed by Dr. Elijah Pope. This was successful, but Clarke did not push his discovery and did not publish any results.

Crawford Long of Jefferson, Georgia, independently used ether on March 30th, 1842, when he operated on Major James Venable for a tumour in the neck. The bill for this is still preserved. The removal of the tumour cost Venables two dollars, and the administration of ether fifty cents. I call it cheap at the price!

Long continued to use ether but published nothing, until he made a statement in 1849. Horace Wells—a dentist of Hartford, Connecticut—next takes the stage. Wells attended a lecture by “Professor Colton”, during the course of which inhalations of nitrous oxide were given. One man fell after inhaling the gas and injured his leg but felt no pain of injury. This set Wells thinking, and the next day he persuaded Colton to give him (Wells) nitrous oxide whilst his partner, John Rigg,

Pictures reproduced from *History of Surgical Anæsthesia*
by THOMAS E. KEYS, Schuman, N. Y., 1945



FIG. 5.—Crawford Long



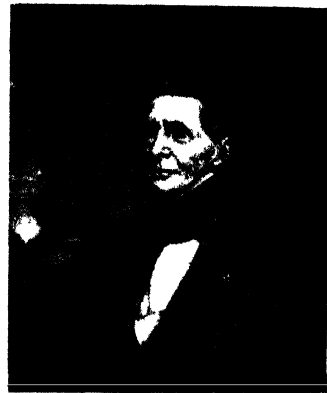
From a print in the Clendening Library

FIG. 6 —Horace Wells



From a print in the Clendening Library.

FIG. 7.—William T. G. Morton



Reproduced from Camac, C. N. B. (Compiler): Epoch-making contributions to medicine, surgery and the allied sciences. Courtesy of W. B. Saunders Co., 1909.

FIG. 8.—John C. Warren

removed a tooth. This was December 11th, 1844. Realising the magnitude of his discovery, Wells went to Boston and called on Morton, another dentist, and upon Jackson, a geologist and chemist. As a result, Wells was asked by J. C. Warren, a surgeon, to give a demonstration at the Harvard Medical School. This he did, giving gas to a boy for the removal of a tooth. Unfortunately, the boy groaned, although he later assured everyone that he felt no pain. The bystanders thought the

whole thing a hoax and Wells left the operating theatre to the sound of derisive laughter—an unjustly discredited man. Eventually, poor Wells committed suicide. W. T. G. Morton, a dentist of Boston, called on Jackson for some N_2O , but Jackson's N_2O bladders were all empty, and he suggested the use of ether as a substitute. This was accepted, and Morton used it for the extraction of a tooth from one Ebenezer Frost. This was so successful that Morton called on J. C. Warren and asked if he might give a demonstration at the Massachusetts General Hospital. Permission was granted, and accordingly Morton set about getting a machine made. He had no time to test this piece of apparatus, but literally snatched it from the hands of the makers and rushed off to keep his appointment with Warren. This was for 10 a.m. Friday, the 16th October, 1846. Morton, of course, was late and Warren impatient. He hadn't forgotten the Wells episode. He remarked to the students with mild sarcasm: "Dr. Morton hasn't arrived—doubtless he is otherwise engaged".



Engraving by H. B. Hall. Reproduced from Rice, N. P.: *Trials of a public benefactor*. New York, Putney & Russell, 1858.

FIG. 9.—*The first public demonstration of anæsthesia with ether*

Thereupon, he picked up his knife, and was about to make the incision when Morton arrived, breathless. Warren turned to Morton and said: "Dr. Morton, your patient is ready". Morton then addressed a few words of encouragement to the patient, who said he wasn't frightened! The inhalation was begun, and a few minutes later Morton gave the word and the incision was made. The patient remained quiet and motionless, and the operation was completed. The patient's name was Gilbert Abbott and the operation was for a tumour in the neck. Warren then addressed the bystanders and said: "Gentlemen, this is no humbug".

Morton next attempted to patent his discovery. He said that the liquid he used was a compound, and he even coloured it. Jackson then told Morton that he should charge him for his advice. Eventually, after much delay, the patent was granted on November 12th, 1846, bearing the names of both Morton and Jackson. Morton endeavoured to keep the constitution of his anæsthetic fluid a secret, but when pressure was brought to bear, agreed to let the Massachusetts Hospital authorities

know its composition. This all sounds not in the best tradition, but Morton was a man of affairs primarily, and wanted to make something out of his discovery. Professor Bigelow, who saw the original demonstration, wrote off immediately to his friend, Dr. Francis Boott of Gower Street. Boott was an American and came from Harvard.

On Saturday, December 19th, 1846, Boott gave ether to a Miss Lonsdale, while James Robinson, a dentist, removed a tooth. This was successful and thus anæsthesia returned to England. Boott wrote to Robert Liston of University College Hospital telling him of the discovery, and on December 21st, 1846, Liston amputated a leg through the thigh, and performed an operation for ingrowing toenail. The anæsthetist was Peter Squire, a chemist. The original machine used by Squire was still extant at Squire's, the Oxford Street chemists, until quite recently. Unfortunately, it has disappeared and a museum piece of priceless value has been lost to posterity. There is



Reproduced from Gordon, H. L.: Sir James Young Simpson and chloroform. London, T. Fisher Unwin, 1897.

FIG. 10.—*Sir James Young Simpson*



Reproduced from the Asclepiad 1887, Vol. 4.

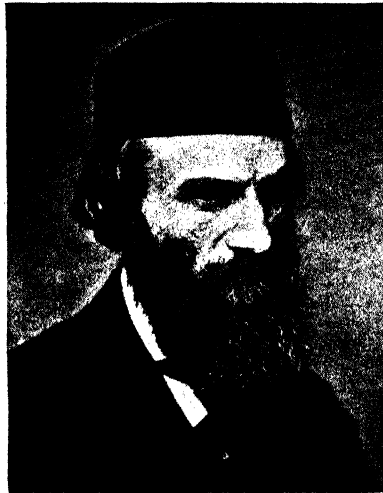
FIG. 11.—*John Snow, the first physician to devote his full time to anæsthesia*

some evidence that ether was used in Scotland some weeks before at Dumfries and Galloway Hospital. However, on January 19th, 1847, James Young Simpson, in Edinburgh, used ether for the relief of labour pains. Simpson found ether difficult for labour. Patients complained of the "smell" and there was apt to be profuse salivation. It was Waldie, a Liverpool chemist, who suggested to Simpson that chloroform might prove more satisfactory. So in November, 1847 Simpson, began using chloroform for obstetrics. On November 15th, 1847, three operations were performed under chloroform anæsthesia, in the Edinburgh Royal Infirmary. Some three weeks or so later the first chloroform anæsthetic was administered in St. Bartholomew's Hospital, London. Simpson did not go unscathed! The Scots Divines denounced him for disobeying the Laws of God. They thundered at him from their pulpits. We must remember that in those days Scotland was a land of bigotry and narrow-mindedness. Everyone pulled down the blinds on Sunday, lest the eyes should distract the thoughts from Holy things. The religion of fear and damnation! Against Simpson and his chloroform, the third chapter of Genesis,

verse 16, was quoted: "In sorrow thou shalt bring forth children". Simpson however, was a good match for the Ecclesiastics, and he pointed out that the Hebrew word for sorrow did not mean physical pain, but the muscular effort involved in labour. He also quoted the book of Genesis, chapter 2, verse 21, showing that God was the first anæsthetist, for he threw Adam into a deep sleep, and removed a rib from his side, and made Eve. In parenthesis, we all have twelve ribs, but it is a charming story.

The controversy went on until Queen Victoria received chloroform in 1853, for the birth of Prince Leopold. The anæsthetic was given by John Snow. Queen Victoria was given chloroform twice, and "Chloroform à la Reine," as it was called, became popular at last.

John Snow, who worked with Liston at University College Hospital, was the first



Courtesy of the Nuffield Department of Anaesthetics, Oxford.

FIG. 12.—J. T. Clover

professional anæsthetist; he was a man of parts and an epidemiologist of note, for he is the John Snow who checked the cholera outbreak. He wrote and researched steadily and designed apparatus for anæsthesia. We owe a great debt to John Snow, as we do to J. T. Clover, who was also a professional anæsthetist. Clover it was who hit upon the idea of administering a known percentage mixture of chloroform. He used an immense bag, which was held slung over the shoulder, and this bag contained a mixture of chloroform and air in known proportions. The patient breathed this mixture through the mouthpiece, which was fitted with non-return valves made of thin leather flaps. Thus, the patient breathed from the bag and exhaled into the surrounding atmosphere. This was made available in 1862. Then, in 1877, he devised his portable inhaler for ether, which permitted the induction to be performed with nitrous oxide. Respiration took place in and out of the bag, and at every third or fourth breath one inspiration of pure air was administered, catching the expiration in the bag. The ether was controlled by rotating the by-pass valve. Now this

apparatus was eventually modified considerably, and the later model was in use up to twenty years ago. I myself was taught to use it, and I can assure you it required a real artist to give a good induction with a Clover. If the gas bag was allowed to become distended, the patient felt suffocated during induction. A truly horrible experience! If the ether was turned on too quickly, the patient coughed and profuse salivation was caused. Salivation leads to swallowing, and ether-laden saliva is a fruitful cause of post-operative vomiting. On the other hand, if the gas was cut off too soon, the patient was apt to come round, or cough and salivate with the ether. If the gas was continued too long, the patient became unduly cyanosed (blue in the face), and this, too, is a most undesirable state of affairs. Yes, it requires an artist to give a good anæsthetic with a Clover's Ether Inhaler and two names come to my mind, that of my old chief, W. Foster Cross, and Raymond Apperley of the Middlesex, both supreme artists.

Mention has been made again of nitrous oxide, which came into prominence once more in 1862. Evans, who was dentist to the French President, learned its administration from Colton, and gave demonstrations at the Royal Dental Hospital, while Rymer, a London dentist, gave demonstrations at the National Dental Hospital. The gas was supplied by Coxeters, who had a place in Gower Street, and the nitrous oxide was sent out in ox bladders. It was not until about 1870 that the gas was sent out, compressed into the liquid state, in copper cylinders. It was about this time that Martin, of Lyons, kept a dog continuously anæsthetised for three days, with a mixture of 85 per cent. nitrous oxide and 15 per cent. oxygen. The dog awakened at the end of the three days apparently unharmed.

We owe a debt to the old magic-lantern, whose illumination was the limelight! For it is thanks to Beard's automatic Oxygen Regulator that we have our modern regulators, which make present-day gas and oxygen possible.

In 1892, Sir Frederic Hewitt, as he afterwards became, brought out his gas oxygen machine. This consisted of two bags, one within the other—one for gas and one for oxygen. This was arranged so as to equalise the pressure in each bag, so that the stopcock always delivered the correct percentage of the two gases. The stopcock was arranged so that the patient could be given air first, with a gradual change to pure nitrous oxide, and then a series of holes were uncovered, allowing more and more oxygen to be added to the mixture. Hewitt's machine was in use up to twenty years ago and my old chief used it for dental work, as I myself have done. It was superseded by automatic intermittent-flow machines such as the McKesson, the Magill, and the Walton. But again I anticipate! In 1867, Junker's Chloroform Inhaler was placed on the market. It consisted of a bellows fixed to a metal tube which dipped below the chloroform in the glass container. The air and chloroform vapour was carried thence to a facepiece of wire, over which was fixed a piece of flannel or gauze. When the patient was anæsthetised, a bent tube was substituted for the wire mask, if the operation was to be an oral one, and the patient was kept anæsthetised by puffing vapour through the tube, which was held in the corner of the mouth. When I was a student this method was used even for such operations as removal of the upper jaw. In spite of the hæmorrhage entailed in this operation, I never saw a fatality. Surely a tribute to the skill of both surgeon and anæsthetist. Compare this state of affairs with the modern method. A tube placed in the trachea

and the throat packed off so that there is no longer risk of the patient drowning in his own blood. The Junker underwent many modifications in order to prevent liquid chloroform being squirted into the mouth. Such a happening was always fatal and mistakes had been known to occur, for it was all too easy to connect the tubing the wrong way round so that the bellows blew the contents of the chloroform container along the tube. Therefore, steps were taken to make this particular mistake impossible. The Junker is still in use for anæsthesia in obstetric practice in some parts of the country, and a very useful method it is. The patient can work the bellows herself.

Mills was first chloroformist to St. Bartholomew's Hospital, and to him we owe the Mills Chloroform Drop Bottle, which is used in conjunction with a specially cut piece of white lint. This is known as the "Bart's method", and is one of the safest methods of administering chloroform.

THEORIES OF ANÆSTHESIA

We know very little of how an anæsthetic really acts. We know, admittedly, that the electrical polarity of the brain alters in anæsthesia, and in sleep too; we know that most of the liquids whose vapour is used in anæsthesia are fat solvents—notable exceptions to this being nitrous oxide and the barbiturates. It has been suggested that anæsthesia results from some interference with the conductivity of nerve cells, possibly a diminution in the oxidation processes going on within the cell itself. We know that, if the body gradually and progressively be deprived of oxygen, serious interference with cerebration occurs. There is incoherence of thought, inability to convert thought into action, and finally loss of consciousness. The condition is similar to that brought about in anæsthesia, but with this difference. In anæsthesia, the body is not deprived of oxygen—far from it. There is sometimes a greater degree of oxygenation than normally. Something, however, occurs to the nerve tissue to render it non-conductive of stimuli. The reaction is reversible, fortunately for us. If it were merely a matter of suppression of nerve impulses we should be faced with ourselves as prisoners in our own bodies, unable to move, unaware of the world around us, insensible to pain or touch, yet still thinking—being aware of the passage of time, for the time sense is well developed within us. Yet this is not what happens in anæsthesia, for there is absolute unconsciousness and the loss of time sense. As a matter of interest, I have found that during the inhalation of nitrous oxide, under certain conditions, one of the first faculties to disappear is that of appreciation of the spoken word. It is possible to know who is speaking, yet the language might be some unknown tongue, for it conveys no meaning to the hearer. Then comes a state of being. The knowledge that *I am*. There is no appreciation of surroundings, no sensation of body, but merely an awareness of being. There is no apparent thought, merely the awareness of *I am*. After that is unconsciousness—and then the awakening. There is no appreciation of time. Minutes or hours may have elapsed, but to the patient it has merely been a sleeping and an awakening, with no time interval between.

I am reminded of something that one of my surgical chiefs told me. He had a friend upon whom he was to perform an operation. During the anæsthesia things went wrong, the patient stopped breathing and collapsed. The surgeon performed artificial

respiration and all became well. However, it was decided that the patient should not be told of this as he was of a nervous disposition. The next day my chief went to see his patient, who mentioned that he had had a curiously vivid dream while under the anæsthetic. He stated that he had seen the operation, that he saw himself on the operating table, but that it didn't make sense. Instead of the surgeon working on his abdomen removing the appendix, he was waving his arms up and down. The patient had described the artificial respiration being performed on himself!

This is neither the time nor the place for a metaphysical discussion. I am here to state facts, but I repeat, we know nothing. At least, we know sufficient to realise how little we do know. No longer do we need to use crude preparations such as decoctions of leaves or roots. We have learnt to extract the active principles, and to isolate the various alkaloids. Our chemists can even synthesise many of them, and we know very accurately upon what part of the body they act, and this action can be controlled by varying the dosage. But we don't really appreciate why they act. Similarly with disease. We know that Grave's disease, with its rapid pulse rate and staring eyes, is due to an enlargement and over-action of the thyroid gland. But what causes the gland to take on this increased activity? There are some who will suggest that it is due to a mental effect stimulating the gland to enlarge and to over-action. It may well be so, but I am in no position to say yea or nay. In the course of my forty-odd years, I have seen many queer things which I have not been able to explain satisfactorily upon a material basis. In man's body, the earth and the universe around us, there is evidence of thought upon a grand scale, of simplicity in apparent complexity. Let us leave it at that.

By some means or another, then, anæsthesia happens. Whether it is due to interference with the oxygenation within the cell is another matter. Let us consider that anæsthesia is a *fait accompli*. How do we know that a patient is anæsthetised? How do we know that they are unconscious? Well, there are certain well-defined signs. The first sign is that of the breathing, which is automatic in character: inspiration and expiration should be equal and opposite, there being a definite automatic rhythm. Secondly, there are certain reflexes, which gradually disappear one after another as the progress of anæsthesia develops, and thirdly, there is the degree of relaxation. In other words, one knows the patient is anæsthetised by the observation of the three R's—the respiration, the reflexes and the relaxation.

The first reflexes which one considers are the ocular reflexes, the lid reflex, the conjunctival reflex, the corneal reflex, the light reflex, size of the pupil, the ocular movements, and lastly, lachrymation. Seven in all.

Then come the laryngeal reflexes. Here, one has firstly that of complete spasm of the larynx, the cough reflex, which disappears as the anæsthesia deepens, and what is known as stridor, or crowing respiration, which is the result of surgical stimulation or laryngeal irritation. This does not occur in very deep anæsthesia. Then there are the pharyngeal reflexes; grouped among these are vomiting, swallowing, and salivation.

As the anæsthesia deepens, so the breathing changes in character. The breathing becomes shallower and quicker; no longer is it thoracico abdominal (that is to say, breathing is partly from the diaphragm and partly with the muscles of the chest wall). As the anæsthesia progresses, the muscles of the chest wall work less and less

and the abdomen becomes more and more obvious in the movement of the respiration and breathing is now entirely diaphragmatic. Eventually, the respiration becomes less and less in amplitude, becomes irregular and finally ceases.

The reflexes, which are at first very active, disappear one by one as anæsthesia passes from the light to the deep planes. The pupil begins to dilate and reacts more and more sluggishly to light, and the cough reflex, of course, disappears. No longer does the patient swallow; and the eye, which has been moist, becomes dry. The movement of the eye decreases; it looks straight ahead instead of moving slowly from side to side or being deviated in a fixed position. Thus, there is no fear of the anæsthetist not knowing if the patient is anæsthetised. There is a very real fear of this with some people, who naturally have no knowledge of the signs of anæsthesia.

The progress of anæsthesia is grouped into five stages. There is the stage of induction when the patient is perfectly conscious. Then follows the stage of analgesia, in which, again the patient is perfectly conscious, but the pain sense is diminished or lost. This stage is made use of in obstetrics to control the pains of labour. The next stage is that of excitement, when anything might happen from the slight movement of an arm to a "rough house". I well remember some years ago a young resident anæsthetist attempting to anæsthetise a rather tough patient. The porter, who was standing by, was called away rather hurriedly, and on his return he found the anæsthetist spread-eagled on the floor, with the patient sitting on top of him holding the mask firmly on his face, and making some suggestion that he should now try some of his own medicine! Then follows the stage of anæsthesia, which is sub-divided into three planes, and lastly comes the stage of overdose.

The planes of surgical anæsthesia merge themselves one into the other. They really are considered in terms of relaxation. Unless the muscles of the abdominal wall are relaxed it is quite impossible for a surgeon to operate within the abdomen. If anæsthesia be not sufficiently deep, the abdominal muscles will not be relaxed, and any attempt to open the abdomen would result in the bowels gushing forth so that the surgeon would be quite unable to perform any operation that he was called upon to do. In order to attain this end, the anæsthetist has to provide sufficient muscular relaxation. As a matter of fact, there are more ways than one of producing this relaxation, but as we are at the moment considering the simple methods of anæsthesia, namely the ether and chloroform inhalation, we will confine ourselves to that matter. More anæsthetic is required to operate within the abdomen than is required to operate upon the extremities, such as a leg or a finger, simply because more anæsthetic is required to attain the degree of muscular relaxation necessary for the operation to be carried out within the abdomen. There are degrees even of abdominal relaxation. More anæsthetic is required to operate in the upper abdomen than is required to operate in the lower abdomen. The lining membrane of the upper abdomen is apparently more sensitive than is that of the lower abdomen. Stimulation of this peritoneum by touch or painful stimuli results in tightening of the abdominal muscles unless the patient is sufficiently deeply anæsthetised.

MECHANISM OF ANÆSTHESIA

It is well known that, as a result of our breathing, oxygen is taken up into the

blood and the products of oxidation are removed for the most part through the lung as carbon dioxide and water. Now, in order to produce a satisfactory depth of anæsthesia by inhalation, one has to administer a certain strength of vapour. This must increase in strength gradually, otherwise the patient will cough or hold his breath. It will be appreciated, too, that we use only a very small proportion of our lung area in normal respiration. Our object therefore is to contrive that an increasing quantity of anæsthetic be taken into the blood stream every minute. This can be done by making the patient breathe more deeply, or by increasing the concentration of the vapour, or both. The vapour is carried to the depths of the lung into the alveoli, and from there is absorbed through the capillaries into the blood stream. From the blood stream it is sent up to the brain, to the centres in the brain, to the nerve tissues and to the tissues of the body and fat, where it is held up to a certain degree. Therefore, it must be remembered that a fat person will take longer to excrete ether or chloroform vapour than will a thin person. Thus we have certain variables to consider. We can vary the percentage of vapour within limits. If we present too strong a vapour the patient resents it; he feels suffocated and is apt to have a prolonged excitement stage. Some people are much more sensitive than others, and resent an acrid vapour much more quickly than would the rather more phlegmatic individual. Next, there is the respiration to be considered; in actual fact, there are two factors here. There is the rate of respiration, and the depth of respiration—in other words how much lung you are actually using per unit of time—and, lastly, there is the pulse rate—the rate and speed at which the blood is being pushed through the lung.

It was Yandell Henderson who drew attention to the importance of carbon dioxide in the gases breathed by the patient. Carbon dioxide stimulates the respiratory centre, and it is this fact which is one of the factors in the maintenance of respiration. The carbon dioxide content of the blood stimulates the respiratory centre in the brain, so that the patient inspires oxygen from the air and removes the carbon dioxide on expiration. The modern anæsthetist makes use of this fact in order to stimulate the rate and particularly the depth of respiration during the induction period. Clover made use of this fact in his Anæsthetic Machine, which he developed as long ago as 1877. The cylinder of carbon dioxide is considered a necessary adjunct by most anæsthetists, for its use will increase the depth of respiration, and thereby renders the patient to the requisite depth of anæsthesia more quickly. This gas is used post-operatively to increase the patient's depth of respiration and thus exercise the bases of his lungs. By this means, we avoid many post-operative lung complications which occurred in days gone by.

Respiration affects the output of the heart, for it is the pumping action of the chest wall expansion which helps to fill the big veins of the thorax, thereby providing the heart with blood to work upon. The heart itself, of course, is a pump which forces the blood out along the aorta, through the great vessels and thence on to the arteries of the limbs. Blood pressure is maintained by the contraction of the heart and arteries acting on the blood against the peripheral resistance. The more blood there is within the heart cavities, the more they are distended and the more forcibly does the heart itself contract. There are, of course, very delicate mechanisms controlling this heart action; the heart output is sensitive to slight changes in oxygenation of the blood and as a result of various reflexes of a local nature the blood can be pushed to one

part of the body in greater or lesser quantity as is required by that particular area. Emotion, too, plays its part. Emotion can cause a great outpouring of adrenalin which raises the blood pressure by causing the arterioles (that is, the minute arteries) to constrict, thereby causing a greater resistance to the flow of blood, with consequent rise of blood pressure. This, of course, is a protective mechanism, and is a relic of the animal days when through fear came the necessary energy for flight.

Ether first stimulates the respiratory centre, thereby increasing the rate and depth of respiration. Chloroform, on the other hand, is a strong respiratory depressant. Because we are dealing with a living being, anæsthesia will always be an art, for as individuals differ in their physical and mental make-up, so does the anæsthetist vary the type of anæsthesia to suit that particular patient.

Anæsthesia has progressed far beyond the days of one hundred years ago, but let us consider now the subject of ether and chloroform as used in days gone by.

One hundred years ago man was given ether and chloroform, and nitrous oxide followed a few years later (1868). The great boon of unconsciousness during operation was conferred. Admittedly, there were certain drawbacks associated with the administration of ether and chloroform. The vapours were pungent, acrid and apt to produce profuse salivation and nausea. The chesty patient was apt to be made more chesty with ether, and post-operative pneumonia was not unknown.

I am reminded of a saying attributed to a well-known surgeon, who said to his anæsthetist: "Let me see, Mr. X, are you using the emetic or the cough mixture this afternoon?" Emetic or no, it still conferred the blessing of unconsciousness.

To Morton, to Squire, to Snow and to Clover we are indebted for the early apparatus for the administration of ether. Each piece of apparatus employed the same principle, that of drawing air over ether, thus vaporising sufficient ether to give anæsthesia. To Clover, we are indebted for a further step forward in that he it was who used nitrous oxide to produce unconsciousness, following up with ether. The induction with ether alone was crude, uncomfortable and of long duration. It often took a quarter of an hour to obtain anæsthesia. Strong men were apt to fight in no uncertain manner, and the ether vapour could produce a most unpleasant sense of suffocation. As I once heard it described: "Two pennyworth of choke and cough". But even this was better than the pain of operation with nothing.

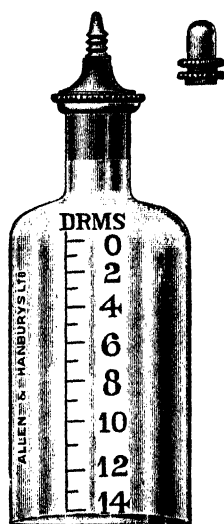
In Morton's Inhaler air was drawn over the ether on a sponge. Peter Squire's Inhaler was similar in design. Re-breathing was employed in Clover's original Inhaler and in his improved model. Sir F. Hewitt modified it by increasing the bore. The improved "Clover" was in use up to twenty years ago—in fact, I was brought up on it! Believe me, it required an artist to use the gas ether sequence, for the change from nitrous oxide to ether was not easy. It *was* possible to anæsthetise patients without their feeling suffocated, but it took a Foster Cross or an Apperley to do it.

The pieces of apparatus you have seen illustrate two of the main methods of inhalation anæsthesia. The open and the partially closed; drawing vapour into the lung from a mask or machine and exhaling into the air, and breathing in and out of a bag. The "Clover" illustrates the latter method, and causes an increased respiratory excursion owing to the build-up of CO₂ in the bag (sometimes as much as 10 per

cent.). There is, however, a third method, that of fully closed anæsthesia, in which the patient's CO_2 is removed by the use of soda lime.

Ether was also administered on an open mask by means of a drop bottle. That used by Bellamy Gardner was the most popular. The closed method of the "Clover" caused a build-up of CO_2 , which caused a considerable stimulation to respiration. Thus the patient was puffing like a grampus, with his respiratory muscles performing far more work than was necessary. The surgeon, too, was hampered in his work when operating inside the abdomen. Thus it became the custom to change over to open ether or even open chloroform, once the anæsthesia was sufficiently deep. This resulted in quieter respiration.

Chloroform was used by the open method by dropping the liquid on to a mask covered by gauze. Mills, who was first chloroformist to Bart's, used this bottle.



Courtesy of Allen & Hanbury's, Ltd.

The original Mills chloroform drop bottle

It was suggested to him by seeing the vinegar bottles on the whelk stalls on his way home from the hospital. He used a piece of lint specially folded, so as to make a tent over the face. The advantage of this method was that the vapour was evaporated from the surface by the patient's breathing, and the likelihood of sudden overdose was considerably reduced. However, let us return to the museum pieces! Clover also used a bag containing a mixture of chloroform and air. This was a mixture of 3.5 per cent. to 4.5 per cent. chloroform, and was obtained by adding 1.5 to 2 ccs. chloroform for every litre of air.

Sansom, of King's College in 1862, used a metal cylinder filled with blotting paper for chloroform anæsthesia, and in 1866 Robert Ellis devised an inhaler with separate containers for chloroform, ether and alcohol. The Junker Inhaler of 1867 has its modern counterpart, Mennell's Safety Inhaler.

Ether and chloroform can be used with gas oxygen by means of the partially closed method, the patient breathing out a portion of the vapour which is made up by fresh gases coming into the bag.

During the last war necessity again became the mother of invention. The lack of gas caused Professor Macintosh and his helpers to make the "Oxford Ether Vaporiser". This machine makes use of the latent heat of crystallisation. It is an ingenious method of keeping liquid ether at a uniform temperature. Boiling water is poured into the outer chamber which causes the crystals in the middle chamber (CaCl_2) to liquefy. As the water cools off the liquid begins to crystallise. During the formation of the crystals the temperature remains constant. Under ordinary circumstances ether, during vaporisation, becomes very cold, and consequently the percentage of ether in the mixture falls rapidly. The Oxford Vaporiser prevents this rapid fall of temperature and the percentage of ether is easily controlled and maintained at a steady level for quite a time. A face piece and non-return valves complete the machine. It is even possible to perform artificial respiration by means of the bag on this machine.

This apparatus was designed only for use where gas was unobtainable and it did noble service in the desert and remote areas. In the areas where supplies had to be dropped by air, ether was contra-indicated owing to its inflammability. Consequently, Professor Macintosh of Oxford designed a chloroform inhaler for use by the unskilled. This machine delivered a certain variable percentage of chloroform, and an ingenious compensating device was devised for variations in temperature.

Now we come to the great Chloroform Controversy. Chloroform had quite a number of devotees, but they all had their share of deaths. Sir James Simpson suggested that death was due to syncope, brought on by sudden failure of the circulation, and asphyxia, caused by the failure of respiration. James Syme, a surgeon of Great Britain, who was one of the first to use ether anæsthesia, suggested that chloroform deaths were due to failure of respiration alone. His attitude was, attend to the respiration—never mind the pulse. This view was held throughout Scotland and parts of England. On the other hand, London said: "Watch the pulse".

John Snow always suggested that, though respiration stopped before the heart as a rule, sometimes the heart itself was the first to stop. Snow was an accurate and careful observer.

In the year 1855, however, a Chloroform Commission was set up in Paris. A report was presented supporting Syme's suggestion that respiration failed before the heart. However, the British Medical Association investigated the problem further by appointing its own committee. They reached certain conclusions as regards chloroform. They suggested: that the lowering of the blood pressure was due to the weakening of the heart's action; that this effect is given by chloroform and not by ether; that death may occur any time during chloroform inhalation, by sudden stoppage of the heart.

This put Syme's theories completely out of court. However, it was Colonel Lawrie who arranged for the first Hyderabad Commission, with himself as Director. Colonel Lawrie's Report supported Syme's contentions. The medical profession, however, was not satisfied with this, and so the second Commission was organised in 1889. Lauder Brunton directed the second research. The conclusions reached were: (1) that failure of respiration is the only means whereby the heart's safety is jeopardised (this, of course, is obviously untrue); (2) that the heart never stops before respiration (this, again, is not true); (3) that the vagus action on the heart is beneficial,

preventing a too great distribution of chloroform; (4) that chloroform does not directly injure the heart substance (which again, of course, is not true); and (5) that the fall of blood pressure during the anæsthesia is beneficial to the heart, and finally (6) that the Glasgow Committee used faulty methods and ascribed to chloroform what was really due to asphyxia.

Embley of Melbourne, Australia, carried out important experimental work, and in his first paper on the subject announced that not only Syme but also the renowned Hyderabad Commission was wrong. In 1902, Embley published in the British Medical Journal his really great contribution. Embley stated that heart muscle is very sensitive to chloroform poisoning; that the drug raises the excitability of the vagus and that deaths in the induction stage of anæsthesia are syncopal, and are not concerned with the respiration. He also said that failure of respiration is mainly due to the fall of blood pressure and that, in the post-induction stage of anæsthesia, there is a general depression of all activities, and that syncope then was less likely to occur through hypersensitivity of the vagus nerve.

Embley makes no mention, of course, of the fibrillation of the heart which can occur in deep chloroform anæsthesia. Levy further clarified the chloroform problem, and he it was who made the following suggestions: firstly, that in properly organised laboratory experiments syncope and sudden death was produced during light chloroform anæsthesia, and that the cause of syncope was the sudden onset of ventricular fibrillation; secondly, that the intravenous injection of adrenalin was almost always fatal in light chloroform anæsthesia, and that such sudden death was produced by ventricular fibrillation.

In order to mitigate the dangers of chloroform administration, it was suggested that the chloroform should be combined with ether. This was done, and the chloroform and ether were used mixed in the proportion of two parts of chloroform to three of ether. This was called "C.2 E.3" and was given in the same manner as pure chloroform. The ether was supposed to produce the depth of respiratory stimulation which the chloroform tended to depress. In order to render the mixture stable, alcohol was added: one part of alcohol, two parts of chloroform and three parts of ether. This was known as "A.C.E".

Is chloroform a dangerous anæsthetic? There are some who maintain that it is not dangerous, provided certain rules be observed. That is to say, provided the patient receives plenty of air, and that the dosage of chloroform is so regulated that sudden over-dosage cannot occur. Those who champion its use maintain that the dangers are grossly overrated. On the other hand, there are patients who are most unsuited to chloroform anæsthesia. The patient who is terrified is one who presumably has a large quantity of adrenalin circulating in the blood stream, and we know that adrenalin in the presence of chloroform can predispose to ventricular fibrillation and cardiac failure. Indeed, the use of chloroform after a local anæsthetic solution containing adrenalin has been injected into a patient is absolutely contra-indicated.

Chloroform has practically died out as an anæsthetic, but there are certain indications when its use is not only justified, but where chloroform is the only anæsthetic of choice. It is the only anæsthetic for use in those cases where there is gross obstruction to the larynx, causing extreme difficulty in breathing, and where any other form of anæsthesia is contra-indicated.

Chloroform also exerts a toxic effect on the liver and kidneys. Chloroform poisoning is due to this action on the liver, and may be a cause of death a few days later.

There are other liquids whose vapours are used for the production of anæsthesia. Notable among these is Ethyl Chloride. This is a rapidly acting anæsthetic from which recovery is equally rapid. Although the vapour is somewhat pungent, it is not at all unpleasant to take, provided it isn't pushed too rapidly. Ethyl Chloride is still very popular, and has been in use for a number of years for the rapid induction of anæsthesia in children. It is customary to change after induction to some other form of anæsthetic, such as open ether. Ethyl Chloride, too, can be used for local refrigeration anæsthesia, for the opening of a small abscess or boil, a spray being used in order to produce actual freezing of the skin. The thawing out process, however, is apt to be very painful.

Divinyl ether or Vinesthene is another rapidly acting anæsthetic, and is used very largely as an adjunct to gas-oxygen. It can be dropped on an open mask and can also be used mixed with ether, so that it produces a fairly rapid induction. It has one drawback in that it tends to produce profuse salivation.

Other substances have been used for anæsthesia, such as Methylene Dichloride. This in its effects is somewhat midway between ether and chloroform. There is a modern rival to ether and chloroform which is known as Trilene (Trichlorethylene).

TRICHLORETHYLENE

This anæsthetic was introduced by Hewer only a few years ago and has already been used in many thousands of administrations. It is not really intended to be used as a full anæsthetic but rather as an adjunct to nitrous oxide-oxygen. Used in this way it is a most excellent addition to the anæsthetist's armamentarium. This anæsthetic has proved most efficacious as an analgesic to relieve the pains of labour.

THE ANÆSTHETIC GASES

Chief of these is nitrous-oxide, which is used in combination with oxygen. Nitrous-oxide was discovered by Priestley, and Michael Faraday also experimented with it. The gas first came to be used for anæsthesia after the unfortunate Wells affair. It was used by the dentists first of all and eventually the Dental Association gave it its blessing. Modern dental nitrous-oxide anæsthesia owes much to such pioneers as Alfred Coleman, the dentist of St. Bartholomew's Hospital. Patterson, who designed a most excellent nose piece, and F. W. Trewby, who some years later designed another excellent apparatus for dental gas.

Other gases have been used for anæsthesia, notably Ethylene, which has the attribute of producing reasonable anæsthesia even when combined with a very high percentage of oxygen, so that the patient is never at all cyanosed.

Acetylene, which in its pure state is quite tasteless and odourless, has also been used in anæsthesia. These two gases were given up largely because they were extremely explosive.

In 1930, Ralph Waters introduced cyclopropane (C_3H_6 , an isomer of propylene) into ordinary clinical practice. Cyclopropane was so expensive that it had to be used in a closed circuit, which I will refer to later. It was thought at first that cyclopropane was the answer to all our problems. It was non-irritant, rapid in action,

fairly rapidly eliminated from the body, and produced fair relaxation. Further clinical experience, however, showed that full abdominal muscular relaxation was not obtainable with cyclopropane unless the anæsthesia was pushed beyond respiratory arrest.

So far mention has been made of the pioneers and of the inhalation anæsthetics they gave us. What of the machines? Let me now refer to some of the early machines and then to some of the modern machines used in giving anæsthetics.

The Colton-Evans machine of 1858 was demonstrated at the Langham Hotel and some of the original gas cylinders, which were made for the compression of nitrous-oxide gas, were in Mr. A. C. King's possession until the "blitz" destroyed them. Mr. King is a Fellow of this Society, and to him we anæsthetists owe a very great deal. He has collected an extensive library on anæsthesia and, indeed, the slides which I am showing you this afternoon were made by him. He has also collected a large museum of anæsthetic apparatus. Indeed, I feel that at this particular lecture he should be standing here in my place.

Clarke's Gas Oxygen machine and the S. S. White machine followed about 1899, and there was Teeter's machine also available. The vapours were warmed by being immersed in water and the water was warmed by a safety lamp—a truly dangerous proceeding!

Next in the series is Guedel's Gas-air apparatus, which he used in 1909. He was the first man to use the mixture of gas and air, by the way, for relief of pain. In the next year the McKesson original model with the intermittent-flow principle was marketed. The McKesson gas-oxygen machine was different from the others in that the gases only flowed when the patient breathed, so that one could get rapid change in the percentage of oxygen in the gas. McKesson, too, was the first man who began what he called "fractional re-breathing", so that the amount of re-breathing in the bag could be varied, thus diminishing or increasing the amount of carbon dioxide in the atmosphere breathed. In 1926 the first McKesson model "G" machine came to England. It was an extremely satisfactory machine and worked very well, but it was bulky and heavy to transport from place to place.

In 1930, McKesson introduced the "Nargraph", which was an improvement. In 1929 came an English equivalent, the "Walton" machine built by Coxeters. The Walton machine was an intermittent flow machine which worked more or less on the same plan as the model "G" McKesson, except that the cut-off of the gases was arranged rather differently. Ten years later, in 1939, came what one might call the "cabinet" model Walton, which is much neater, for the gas and the oxygen bags are hidden away out of sight. Gauges and dials enable the anæsthetist to see whether the gases are flowing, and whether the cylinders are fully charged or no.

The latest model of dental apparatus for anæsthesia is the Portaneast, and is made by the British Oxygen Company. It has no bag, and it has easy control of pressure, of flow, and of percentage.

There is another apparatus called the "Jecta Flow" which works upon the injector principle. This method was used, by a dentist named Marston, thirty years ago. The modern model was devised quite independently, by Mr. Tally of the Medical and Industrial Equipment Company. Working on a totally different principle is Gwathmey's 1910 water sight feed machine, which was modified by Boyle in 1917.

The first machine was crude, judged by present-day standards. It had water flow meters. Tubes with pinholes at intervals dipped below water in a glass reservoir and the flow of gas and oxygen was estimated by the number of bubbles coming from each tube. The gases were then carried over to a bottle which contained ether or ether and chloroform mixture, and from there the vapour was led to a gas bag close to the patient's face. The gas cylinders were kept warm by means of a little lamp, and thereby hangs a tale. In those days we carried our lives in our hands with Boyle's lamp. Its position was at the valve of the gas cylinder, in order to prevent freezing of the gas. Modern nitrous-oxide does not contain any water vapour, so no anti-freezing apparatus is necessary, but explosions in the past were not unknown from the lamp igniting the ether vapour!

With the passage of the years the Boyle machine was developed in two directions. Firstly, the control of the flow of gases was improved enormously, and secondly came the control of the vaporiser for ether and chloroform. Instead of the old water sight feed machine, there came the original flow meter which was built by Coxeter; this consisted of a glass tube with tiny holes drilled at intervals along its length. The bobbin which was in the centre was blown upwards by the gases and there was a different flow meter for each gas. As the gas blew the bobbin higher up in the tube, so more and more holes were opened, thus allowing a greater flow of gas. By these means the machine was calibrated. Of course, the accuracy was of a very low order, but it was a step forward. The ether and the chloroform bottles were grouped together in one unit with the flow meters and instead of the gases being passed through the liquid, controlled by a simple on-off valve, they were now permitted to travel over the surface of the ether, and the control valve was much smoother in operation. It was now possible to ensure a really smooth induction of anæsthesia.

The Siebe Gorman flow meter next appeared, which consisted of a glass tube, which was ground conical inside, so that the apex of the cone was towards the bottom of the flow meter. As the gas valve was opened, so the bobbin rose, allowing more gases to pass, the higher it ascended; for, owing to the conical nature of the tube, the higher the bobbin rose the more space was there for gases to pass. This was a little more accurate than was the original Coxeter flow meter, but it was the next type of flow meter which has given us our greatest degree of accuracy, *e.g.*, the "Rotameter". The little metal bobbins do not touch the sides of the tube but actually rotate. There are minute vanes on them so arranged that the passage of gas causes the bobbin to rotate. The inside of the tube is ground conical so that more gas is allowed to pass the higher the bobbin floats.

There were other types of flow meters used in America and Canada, but these were developed by McKesson and Gwathmey. Gwathmey utilised the water depression sight feed. It was bulky and was liable to be broken, but was extremely accurate. A restriction was arranged in the tube, and behind this restriction was a glass tube which dipped down into the water. As the gas flow was increased so the water in the chamber was depressed in the tube owing to the rise in pressure behind the restriction.

To Boyle's machine has been added the carbon dioxide absorption apparatus for the fully closed method. Many of us have designed absorption apparatus in the past.

The latest one designed by Mushin and made by the British Oxygen Company has proved very successful and is attached to the latest Boyle's machine. The absorber consists of a chamber containing soda-lime which absorbs the carbon dioxide from the exhaled breath. There are two valves which are of the non-return type, so that the patient breathes round and round the absorber. The fresh gases are added as the case warrants and the oxygen is added in physiological quantities. It is extremely economical, and also has certain advantages. It conserves the moisture so that the patient does not lose water vapour from his lungs; it also keeps the anæsthetic vapours tolerably warm, and it has the added advantage that rare and expensive gases can be used, as there is no waste from gases being expired out into the atmosphere.

Waters, of America, was the first man actually to popularise the absorption apparatus, and his original machine consisted of a small canister containing soda lime, which was placed right by the patient's face next to the face piece with the bag on the other end of it. Thus, there was just to-and-fro breathing between the face piece and the bag, the breath, of course, passing through the soda-lime at each inspiration and expiration. No description of apparatus would be complete without showing that of I. W. Magill. His machine differed from the other apparatus in that the ether was dripped, drop by drop, into a warm chamber. The apparatus consists of a bank of flow meters with the ether chamber on the top dripping through a valve and sight feed into the warmed mixing chamber beneath.

ENDOTRACHEAL ANÆSTHESIA

When I was a student, as mentioned above, my Chief was wont to perform the operation for removal of the upper jaw for malignant disease. The anæsthetic was chloroform, administered by means of a Junker's Inhaler, with a small tube placed in the corner of the mouth. There was, of course, considerable hæmorrhage and there was serious risk of the patient drowning in his own blood. Such, however, was the skill of the surgeon and the anæsthetist that somehow or other this never happened. All honour to the teamwork.

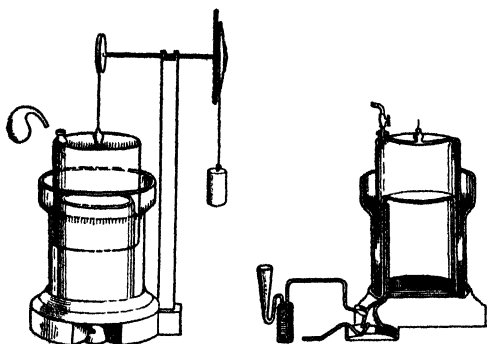
The operation performed in this manner caused a considerable strain upon both surgeon and anæsthetist. Contrast this welter of blood and respiratory hazard with the modern method of anæsthesia, in which a tube is passed down into the trachea (the windpipe), the throat is packed off, and the surgeon can perform his operation inside the mouth with ease, while the anæsthetist has absolute control of the airway. The anæsthetist is out of the way, and by means of electric suction the operative field is kept clear of blood so that the surgeon can work unhampered. That is what endotracheal methods of anæsthesia have achieved—safety for the patient and operative ease for the surgeon.

It was in 1542 that Vesalius passed a tube into the trachea, and Hook in 1667 gave a demonstration before the Royal Society. In 1837, John Snow, the first anæsthetist, used it for prolonged anæsthesia in the animal, breathing chloroform in and out of a bag.

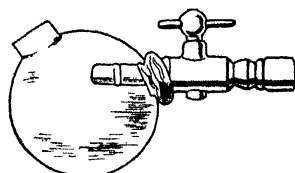
In 1871, Trendelenberg performed a preliminary tracheotomy. He used a tube attached to a gauze mask, upon which ether and chloroform could be dropped.

In 1880, William McEwen designed a metal tube which he passed into the trachea

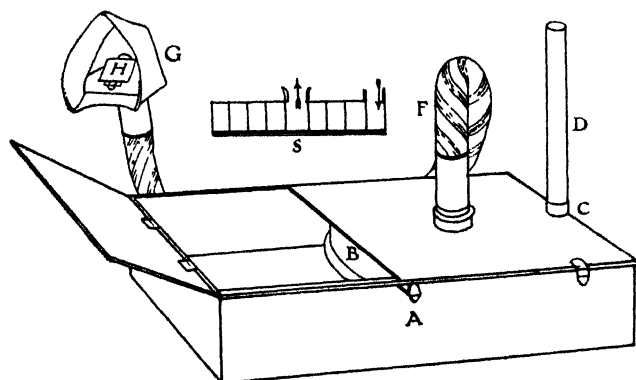
EXAMPLES OF EARLY ANÆSTHETIC APPARATUS



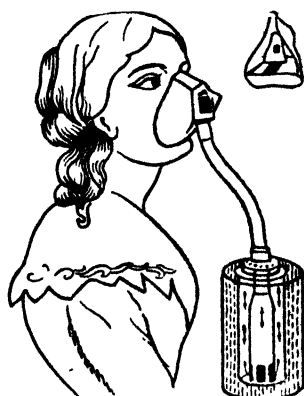
1799.—Humphry Davy's nitrous-oxide gasometer



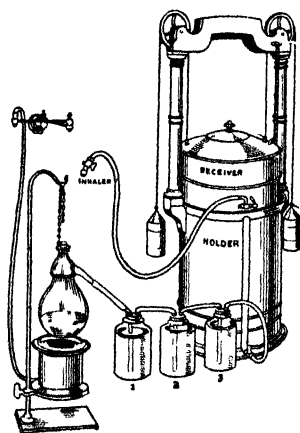
1846.—Morton's ether inhaler



1847.—Snow's ether apparatus



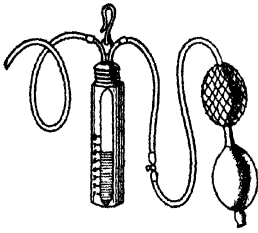
1853.—Snow's portable chloroform inhaler



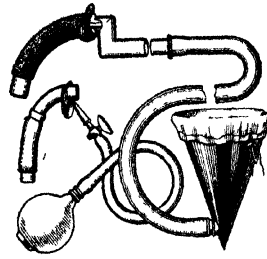
1860.—Colton's nitrous-oxide machine



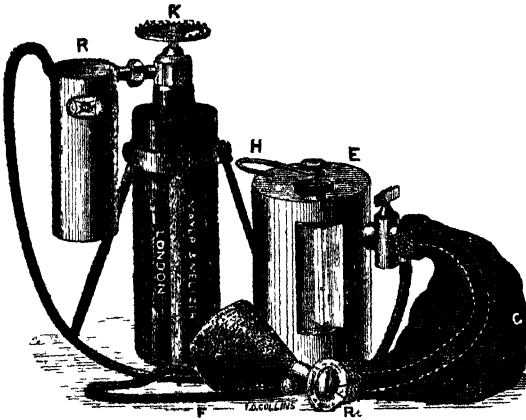
1862.—Clover's chloroform bag



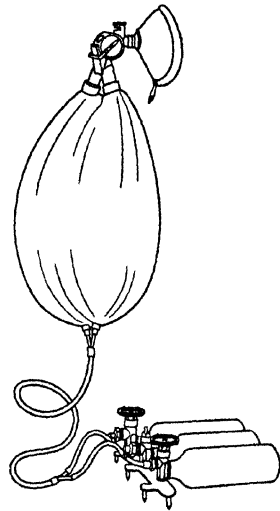
1867.—Junker's chloroform inhaler



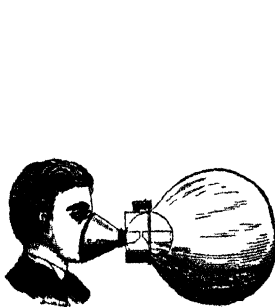
1871.—Trendelenburg's endotracheal tube



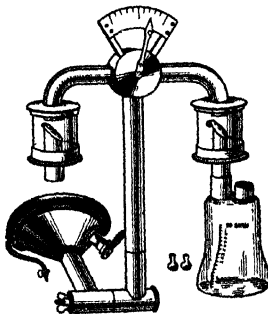
1876.—Clover's gas-ether apparatus



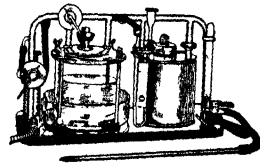
1892.—Hewitt's gas-oxygen apparatus



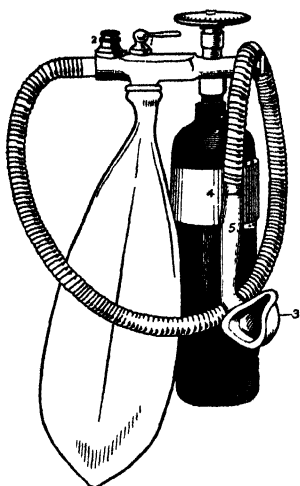
1877.—Clover's ether inhaler



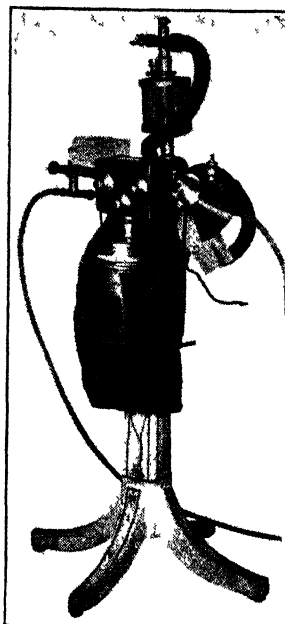
1903.—Vernon Harcourt's chloroform-regulator



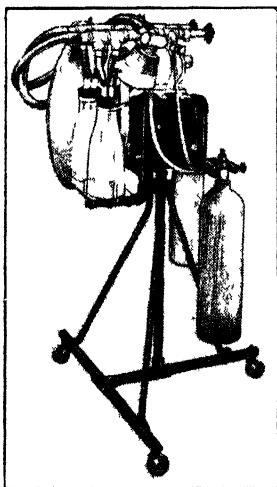
1912.—Kelly's endotracheal tube and apparatus



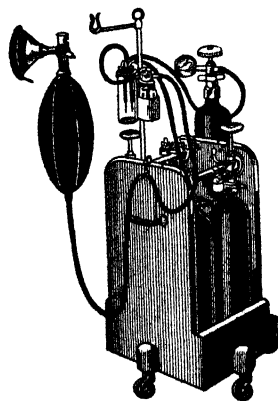
1909.—Guedel's gas-air apparatus



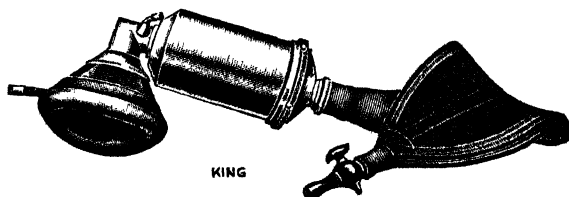
1910.—McKesson's intermittent flow gas-and-oxygen apparatus



1915.—Dennis Jackson's CO_2 absorber



1917.—Boyle's portable apparatus



KING

1925 (circa).—Waters' soda-lime canister

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through the mouth, and the patient breathed the anæsthetic through this while McEwen operated upon carcinoma of the tongue.

In 1902, Kuhn improved this tube and made it flexible, using it for tracheal anæsthesia.

In 1912, Kelly designed an apparatus by which he was able to pass warm, moist air with ether vapour down to the bifurcation of the trachea by means of a gum elastic catheter passed through the larynx into the trachea.

In 1909, Meltzer had used the method in America, and in 1912 Gask and Boyle of St. Bartholomew's published their method of giving endotracheal ether.

In 1914, Rowbotham and Magill both used endotracheal ether in facial injuries in the First World War.

In 1916, Shipway devised his machine for endotracheal ether and chloroform, but it was Magill in 1921 who really began to popularise the method. He used an ether drip into a warmed coil, which was warmed by means of an electric lamp. Rowbotham also in the same year devised a machine for endotracheal anæsthesia.

The endotracheal method of administering an anæsthetic is not just the anæsthetist's excuse for not holding a mask on the face. Its use has made the rough places of surgery smooth, for it has given the anæsthetist complete control of the airway. This means that the surgeon can work inside the mouth with safety and with equanimity. No longer need there be bubbles and frothing blood obstructing the view, and the fear of a patient drowning in his own blood is banished for ever. Nay, more, this endotracheal method has made such extensive operations as the removal of a lung not only possible but a comparatively safe procedure. Without endotracheal anæsthesia, thoracic surgery would still be limited to the drainage of empyemata and the thoracoplasty. Thanks to the endotracheal tube fitted with an inflatable cuff the anæsthetist has complete control of the airway and respiration itself, for by means of controlled respiration the anæsthetist can arrange the exact rate and depth of the respiration. Indeed, there are available ingenious pieces of electrical apparatus called "spiropulsators", which are made for this purpose. Endotracheal anæsthesia wisely used can be counted a surgical blessing.

The tube may be passed through the nose blindly into the trachea, which is not a difficult procedure; it is out of the way of a surgeon working in the oral cavity: on the other hand, it may be passed under direct vision by means of a laryngoscope. This is an instrument fitted with a blade to keep the tongue out of the way, and this blade or spatula also serves to move forward the tip of the epiglottis so as to give an adequate view of the larynx and vocal cords. Illumination is by electric light arranged on the spatula. Alfred Kirstein of Berlin made the first laryngoscope for direct vision, and Chevalier Jackson made the original laryngoscope, but there are now in use those designed by Magill and Macintosh. The latter is used in a slightly different manner to the others, for it is curved to fit over the tongue, and by pushing the base of the tongue forward, the epiglottis hinges forward, thus exposing the larynx. This laryngoscope has certain advantages in that intubation can be performed with the patient in a lighter plane of anæsthesia, but the exposure given with this instrument is not quite so good as with the Magill.

LOCAL AND REGIONAL BLOCK

I have referred at length to the subject of inhalation anæsthesia and I hope that I haven't wearied you. Now, I should like to discuss a further branch of anæsthesia.

There are other methods of producing insensibility to pain, and the relaxation of the abdominal muscles so necessary to abdominal surgery. Fortunately for us, nerve tissue has a definite affinity for certain substances, called local anæsthetics, which penetrate the nerve tissues to a greater or lesser extent and become "fixed" therein. As a result of this, the nerve ceases to conduct impulses, and anæsthesia results in the case of sensory nerves, while temporary paralysis is the result of blocking motor nerves. Nerve tissue varies in its sensitivity to local anæsthetics, a sensory nerve will be blocked more easily than a motor nerve. Thus it is possible to produce loss of sensation to pain stimulus, yet still have motor function present by the use of suitable dilution of local anæsthetic.

Nerve conduction can be blocked at several points. The injection can be carried out at the site of operation. That is to say, the fluid is infiltrated under the skin and underlying tissues at the actual site of incision. An example of this is when the dentist removes a tooth by means of infiltration around the gum, or when a sebaceous cyst or wen is removed from the skin. Local anæsthesia will suffice for the removal of small innocent tumours from the breast and other superficial parts of the body. The nerves supplying the field of operation may be blocked near to the actual site of the incision. This is known as a field block, and consists of depositing local anæsthetic in the tissue planes through which the nerves run that supply the operation area. It is possible to use this method for certain operations upon the abdomen, blocking the nerves as they cross the costal margins, and as they come up in the flank. This method was popularised by Labat, and is very satisfactory in practice.

It is possible to block the nerves along their course after they have left the spinal canal. Thus, for an abdominal operation, the lower dorsal nerves from 7 to 12 can be blocked by fluid put around and even into them as they lie between the ribs on the chest wall. This is an intercostal block, and may be anterior or posterior. The posterior block causes paralysis of the lower chest so that respiration is largely diaphragmatic, whereas the anterior block gives anæsthesia without intercostal paralysis. The nerves can be blocked before they pass between the two layers of intercostal muscles: that is a paravertebral block. This blocking of the nerves in their course is referred to as regional anæsthesia.

There is another site at which nerves can be blocked, namely, within the vertebral column but outside the dura mater (the covering of the cord). This method is known as epidural or extradural block. It is performed by passing a needle in the midline between the spines of the lumbar vertebræ. The point, however, does not puncture the dura mater (which would then be a spinal tap), but stops short of this. Some 20 to 35 ccs. of local anæsthetic are then injected into the epidural space, which gives anæsthesia depending on the amount of fluid injected. The protagonists of this method claim that there is not so profound a fall of blood pressure with the extradural block as there is with the subdural or spinal block. Personally, I feel there is no difference in this respect between either method.

Finally, it is possible to anæsthetise the nerves as they come off from the spinal cord itself within the dura mater; this is spinal anæsthesia.

The anæsthetic fluids used for local field block and regional anæsthesia are either Novocaine, Nupercaine or Amethocaine, or a combination of them. Novocaine is a rapidly acting anæsthetic of comparatively short duration (forty-five minutes to one hour), and the latter two are comparatively slow-acting but last from two to three hours. A mixture of novocaine and amethocaine gives rapidity in onset with long-lasting results. The strength used varies with the site of injection.

Owing to toxicity, there is a limit to the amount of anæsthetic which can be injected. Therefore, with a field block a low percentage solution is used owing to the comparatively large quantity of actual solution injected. In this it is customary to use 0.5 per cent. novocaine or 1 in 2,000 amethocaine. On the other hand, for the intercostal block, a 1 in 1,000 solution of amethocaine is used, and 10 ccs. is placed around each intercostal nerve, whereas in the case of the epidural route it is usual to inject 1 in 750 or 1 in 600 amethocaine (or nupercaine) to produce the necessary anæsthesia.

It was not until 1904, when Einhorn synthesised novocaine, that local or regional anæsthesia became possible with safety. Before this time cocaine had been used for local and spinal anæsthesia, but it proved toxic and many patients exhibited an idiosyncrasy to it.

Stovaine, discovered by Fourneau, proved satisfactory for spinal anæsthesia, but was apparently too irritating for local anæsthesia. Cocaine, of course, is a most excellent surface anæsthetic, and is used in eye, ear, and nose and throat surgery. Anæsthetists use it, too, for spraying the larynx before passing an endotracheal tube.

There are certain objections to the intercostal block, for it requires considerable skill to place the anæsthetic in just the right place, and it means that some ten separate injections have to be made. If the patient has been given an intravenous anæsthetic first, he will have no cause for complaint, but the conscious patient may well complain of repeated needle pricks, unless he has received adequate pre-medication, whereas with spinal or epidural anæsthesia there is only one prick, and this can be made painless with a little novocaine injected into the skin beforehand. The use of local and regional block is of great help to the surgeon, anæsthetist, and patient. For the surgeon can work in an almost bloodless field if adrenalin be added to the local anæsthetic fluid; and in abdominal work the muscles are completely relaxed. Thus the patient need only be kept asleep by means of repeated intravenous injections of pentothal or gas oxygen by inhalation, for such things as ether, chloroform, etc., are no longer necessary, and post-operative vomiting is now reduced to a minimum.

Fractures of the limbs can be reduced satisfactorily and painlessly by the injection of a few ccs. of 2 per cent. novocaine at the site of the fracture between the bones. In upper limb injuries, the brachial plexus of nerves can be blocked as it leaves the neck and passes over the first rib before entering the upper limb. The blocking of the nerves to the abdomen, however, will not abolish all painful stimuli, for if the intestines and viscera are pulled on, pain will be transmitted via the splanchnic plexus of the sympathetic nervous system. Thus, it is customary to perform a splanchnic block. This may be done in one of two ways. By injecting through the back at the

level of the first lumbar vertebra according to the method of Kappis, or by the anterior route after the abdomen is opened. The splanchnic plexus block causes a fall of blood pressure.

SPINAL ANÆSTHESIA

This has quite a long history and is what one might now describe as "one of the old inhabitants"; it is almost as old as ether and chloroform but not quite.

Spinal anæsthesia has its uses and is a method which has been tried and has not been found wanting. For successful application it requires considerable skill and experience.

In 1885, Corning of New York put 30 minims of 3 per cent. cocaine between the eleventh and twelfth thoracic vertebræ into the spinal canal. Later he coined the words "Spinal Anæsthesia" for this. In 1899, August Bier of Bonn had 2 ccs. of 1 per cent. cocaine put into his own spinal canal (this he persuaded his assistant to do). This brave man, finding it very satisfactory, then persuaded his assistant the next day to receive the same dose into his spinal canal. This, too, proved satisfactory. Later, Bier published six cases of operations performed under spinal anæsthesia. Bier reserved spinal anæsthesia solely for operations upon the lower extremities, or upon the genitalia, but those who came after him used it far more freely. Morton, of San Francisco, removed the superior maxilla (that is to say, the cheek bone) under spinal anæsthesia, and, in 1902, Le Filliâtre advocated total spinal anæsthesia, using 1.5 per cent. cocaine, but, not unexpectedly, serious difficulties occurred. It wasn't until 1904 that Fourneau synthesised stovaine. The name "Stovaine" is an anglicised version of his own name—Fourneau, a stove.

In 1907, Barker in England used stovaine 5 per cent. mixed with glucose 5 per cent., and after him came many others—notably Pitkin in 1927 recommending a light solution. Howard Jones in 1930 introduced what is now known as "nupercaine". The Howard Jones technique was modified considerably by Etherington Wilson in 1931, who used a technique based on the rate of rise of light nupercaine along the spinal cord. In 1934, Silverton, Hasler and myself used a heavy solution of nupercaine, and in 1939 Lemmon and Pascal advocated the use of continuous spinal anæsthesia. Spinal anæsthesia can be used in several ways. It can be used as a replacement technique with fluid injected slowly into the spine, of the same specific gravity or very nearly so as the cerebro spinal fluid. On the other hand, one may use the solution which is heavier than cerebro spinal fluid, such as the heavy nupercaine and stovaine. Then again, one may use the light solution. The light solution is, as its name implies, lighter than cerebro spinal fluid and of a lower specific gravity, and this difference in specific gravity of the solution is made use of to spread the height of anæsthesia as the anæsthetist wishes. Etherington Wilson showed that nupercaine put into the spinal canal at a certain temperature rose in the spinal canal one inch every five seconds. By measuring the spine, it is possible to calculate to what height the anæsthesia will ascend in a certain length of time. The method is very accurate. Similarly, it is possible to limit the heavy solution. If the heavy solution be introduced into the spinal canal and the patient be tilted with the head downwards to a certain degree, the anæsthetic will spread

along the spinal canal, depending upon the dose, the time, and the degree of the tilt. As a result, there is complete anæsthesia up to the level desired, together with complete muscular relaxation. As a rule, the sensation of touch and of heat and cold remain—depending upon the strength of the solution injected.

There are certain advantages in the use of spinal anæsthesia, one being that the muscular relaxation is absolutely complete. This is of great advantage to the surgeon and helps him in his operations on the abdomen. It is of use where inhalation anæsthesia is contra-indicated. There are certain disadvantages in the use of spinal anæsthesia; there may be a severe fall of blood pressure when the anæsthetic reaches a certain height in the spinal canal. When one obtains anæsthesia of the splanchnic area, that is to say, up to the level of T 5, 6 and 7, then there is a complete and profound fall of blood pressure. This may be of no serious consequence in those patients whose cardio-vascular system is in good trim, but where there is likelihood of the cardio-vascular system lacking elasticity and resilience, this fall of blood pressure can be of a serious nature. Pitkin gave to this condition the name of "spinal shock". However, there are analeptic drugs which can be used to anticipate and correct this happening. Indeed, some fall of blood pressure can be of assistance to the surgeon and benefit to the patient.

Spinal anæsthesia requires the most meticulous asepsis upon the part of the anæsthetist, and under proper conditions it is a most useful and effective method of anæsthesia. The spinal gives relaxation, elimination of shock, the blocking of pain impulses, and by using the modern intravenous barbiturates, the patient can be kept gently sleeping while operations of the first magnitude are being performed on his insensitive body. Thus, he has no memory whatsoever of the operation being performed, but he is spared the toxemia which might occur as a result of the use of other inhalation anæsthetics such as ether or chloroform. As a matter of fact, spinal anæsthesia is used to-day not only in surgical operations but also as a means of diagnosis and for therapeutic use. There is a condition which occurs in children known as "mega colon" or Hirschprung's disease, in which the patient has a very large, distended, protuberant abdomen. One of the symptoms of this disease is that the child passes large and offensive stools. The judicious administration of a spinal anæsthetic has been known to cure this condition, apparently breaking the vicious circle of imbalance of innervation, which is the possible cause. Spinal anæsthesia has proved useful in the treatment of post-operative ileus, also. It is used too, in assessing whether a patient will benefit from an operation to relieve arterial spasm. The spinal anæsthetic in this case causes vaso-dilatation with consequent increased warmth of the skin. This local rise of skin temperature can be measured, and if it occurs is evidence that the operation for relief of arterial spasm is likely to be successful.

INTRAVENOUS ANÆSTHESIA

In 1656, Christopher Wren—the Sir Christopher Wren of St. Paul's—was then a professor of anatomy at the University of Oxford. He it was who performed an experiment upon a dog at the house of the French Ambassador, the Duc de Bordeaux. He ligated the vein of a large, lean dog and made an opening into the vein; into this he introduced a syringe which was charged with opium and an infusion of crocus

metallorum. The syringe was formed from a quill and a bladder! The opium produced stupefaction but did not kill the dog. He performed the same experiment upon another dog, but in this instance "the dog did vomit up life and all"! (Boyle, 1665, *Philosoph. Transact.*) He also tried the effect of intravenous beer and wine.

Jarman states that Sigismund Elsholtz in 1665 injected an opiate intravenously to produce insensibility, and Richard Lower in February, 1665, performed blood transfusion in animals. In 1667, Jean-Baptiste Denis assisted by Dr. Emmery, first transfused blood in human beings. Blood transfusion in man was prohibited by law in France and England, for Denis lost a patient as a result of transfusion. John Braxton Hicks in 1868 added sod. phosphate to blood used in transfusion and showed its anti-coagulant properties.

Intravenous anæsthesia proper began with Pierre-Cyprien Oré, who used chloral hydrate 10 grms. in 30 ccs. water on the human being. He himself was enthusiastic, but no one else was! Oré reported his first case on February 16th, 1874. H. Dresser of Munich in 1899 introduced hedonal, methyl-propyl-carbinol urethane, and N. P. Krawkow and his associates at St. Petersburg, as it was then, demonstrated the use of hedonal as an intravenous anæsthetic. It was given in normal saline.

Bier in 1909 used regional intravenous methods to obtain anæsthesia of the limbs. He injected novocaine intravenously near the site of the proposed operation, and in 1912 Goyannes of Madrid used intra-arterial novocaine. Burckhardt in 1909 tried chloroform and ether intravenously. Chaldecott and Rood in London used ether 5 per cent. in saline intravenously by the drip method with some success.

In 1913, Noel and Souttar recommended paraldehyde intravenously for short procedures of a minor character.

In 1929, M. G. Marin of Mexico used alcohol intravenously after Nakagawa had used it experimentally. Martin Kirschner used tribrom-ethyl alcohol (avertin) intravenously also at this time. None of these agents given by the intravenous route found lasting favour as full anæsthetics. They were uncertain in action and difficult to control.

To the barbiturates we owe the success of intravenous anæsthesia. The first to be synthesised was veronal (barbital) by Emil Fischer of Berlin. Veronal, together with phenobarbital, soneryl, dial and neonal, followed. In 1924, Perlis and Fredet introduced Somnifène, a combination of veronal for intravenous use, and pernocton was used by Bonn in Germany in the year 1927. This drug did not find favour much in this country.

Lundy in America, in 1929, recommended sodium amytal for intravenous use as an anæsthetic. It was used widely, but with the advent of the short acting drugs its use has largely been in the psychiatric field. The long acting-barbiturates are not satisfactory for full anæsthesia for they tend to leave the respiratory centre too depressed for too long a time, resulting in post-operative pulmonary complications.

In 1930, R. M. Fitch, Ralph Waters and A. Tatum reported on pento barbital sodium (nembutal) and Lundy recommended it as a hypnotic agent. The tendency was to use the barbiturates as the preliminary basal narcotic, following up with inhalation anæsthesia. This avoided pulmonary complications very largely. Then came the real short acting barbiturate—evipan, synthesised by Kropp and Taub, and reported on clinically and pharmacologically by H. Weese and W. Scharpf

in 1932. Two years later, Lundy introduced the pentothal technique by intermittent intravenous injection. Pentothal (sodium ethyl—1 methyl butyl thio barbituric acid) was more potent than evipan and was also a short acting barbiturate. The milestone had been reached!

It is possible to produce full surgical anæsthesia with this drug, and major abdominal operations can be performed with pentothal as the sole anæsthetic. Care, however, must be exercised with this technique, which is one for the expert. Pentothal may be used as a dilute continuous drip, so as to keep the patient just asleep after a spinal anæsthetic has been used.

John Geradin says of the poppy in the Herbal (1633): "The leaves, knops and seeds stamped with vinegar, woman's milk and saffron and put in the fundament as a clyster, causeth sleep".

RECTAL ANÆSTHESIA

In 1847, Pirogoff, a famous Russian surgeon (whose name is perpetuated through an amputation he devised), described his method of administering ether by the rectum. It is said that he planned originally to administer liquid ether per rectum, but that Magendie warned him of its possible dangers. Pirogoff, therefore, devised a method of vaporising the ether by means of heat and he then introduced the vapour per rectum. Pirogoff was enthusiastic and tried to push this method. It was taken up by Roux, Y'Yhedo, and Duprey, who wrote of their experiences with the method. Liquid ether, pure or mixed with water, was employed by them, but the method did not find favour, for ether is definitely irritating, and the rectal mucosa does not tolerate irritating substances with equanimity! Some thirty years later the method was tried again by Daniel Mollière of France and other workers. However, although they confined themselves to ether vapour blown into the bowel with a bellows, trouble ensued with the outraged rectal lining membrane and the method was again abandoned.

In 1903, J. H. Cunningham in America started the rectal ether method, using air as the vehicle for conveying the ether vapour into the bowel, and in 1905, together with Frank Lahey, a paper was published describing the method.

In 1910, W. S. Sutton published one hundred and forty cases done in this way, using an improved method; he used oxygen instead of air as the vehicle, and made an improved apparatus.

In 1913, J. T. Gwathmey delivered a paper on rectal-oil ether anæsthesia. The carron oil was to overcome the irritation of the mucosa set up by the ether. The mixture, which had been well mixed and kept stirred, was introduced into the rectum very slowly as an enema. The method proved quite satisfactory, but it was found that olive oil was more suitable than carron oil. Gwathmey reduced his ether content in the oil-ether mixture, and developed a satisfactory technique for the relief of labour pains, by instillation of oil-ether into the rectum during parturition. By 1930, he was able to report on 20,000 cases delivered by this form of anæsthesia.

The final technique which was evolved necessitated three intramuscular injections of magnesium sulphate, with a rectal injection of quinine, alcohol, ether and olive oil.

In 1926, Butzengeiger used tribrom-ethyl alcohol for rectal anæsthesia. This

compound was discovered by Eichholtz in 1917 and was put on the market by Bayer Products under the name of "Avertin". The tribrom-ethyl alcohol crystals were dissolved in amylene hydrate, 1 gramme of the solid in 1 cc. of the liquid. The dose was calculated according to the weight of the patient, 0.1 gramme of avertin being given per kgm. of body weight. Avertin proved unsatisfactory for full surgical anæsthesia, as there was too much respiratory depression, and the anæsthesia lasted too long with consequent risk of suboxygenation. As a form of basal narcosis to induce unconsciousness, however, the drug proved excellent, and it became very popular indeed. Avertin was not the only drug to be used per rectum: nembutal, evipan, and pentothal have all been used and have their protagonists.

REFRIGERATION ANÆSTHESIA

This is not new, though it has lately been resurrected. Certain African tribes made the boys stand in cold running streams up to the waist for some time before the ritual performance of circumcision. Sir Benjamin Ward Richardson, a pupil of John Snow, introduced the ether spray for local anæsthesia in 1867. Ethyl chloride supplanted ether some years later, as it was found to be quicker owing to its more rapid rate of evaporation.

Refrigeration anæsthesia was employed by Severino for amputation in the seventeenth century, and Larrey used it for amputations in 1807. Seven years ago (1941) F. M. Allen of New York published a paper which he read to the International College of Surgeons. He used cracked ice, snow ice, or ice water as the sole anæsthetic for forty-three amputations of the leg. There was no shock before, during, or after operation. Healing, however, was somewhat slower than normal. Since then, the method has been tried by many anæsthetists and found satisfactory. It possibly has a place in surgery when no other method of anæsthesia is available.

CURARE

Curare is not an anæsthetic, but its use has revolutionised anæsthesia. Curare, of course, is no new discovery. It was brought back to this country by Sir Walter Raleigh after his voyage to the Orinoco and British Guiana, which was discovered in 1595. He was much concerned in finding an antidote to the poison, and his pen paints vivid pictures of its use by natives between the Orinoco and Amazon.

In 1812, Charles Waterton wrote "Wanderings in South America", and gave an account of his examination of "Wourali". He tells us of a she ass, wounded by a poisoned arrow, being restored to life by rhythmically inflating her lungs with a bellows. Thus he demonstrated that death following the use of curare was due to asphyxia.

In 1844, Claude Bernard showed that curare acted at the neuromuscular junction. His experiments stimulated its use in France, where it was used to treat hydrophobia, tetanus, epilepsy and chorea. In 1944, Gill states that results were unpredictable, due to lack of an available standard preparation.

Crude curare came as a brown, sticky mass, packed in small gourds, clay jars or hollow bamboo canes, and hence it came to be distinguished as calabash, pot or tube curare; from the method of its packing. In 1895, Boehm made the first systematic analysis of this crude stuff and found that the curare contained quarternary nitrogen and tertiary nitrogen alkaloids. The quarternary groups caused paralysis and the

tertiary nitrogen alkaloids were cardiac depressants. In 1935, Ranyard West, working on tetany and muscle rigidity, could not co-ordinate the presence or absence of lissive properties with Boehm's classification of gourd, pot or tube curare. Gill, whose knowledge of the South American Indian, his customs and his folk-lore, is considerable, would not expect any uniformity in the specimens. King (1935) isolated from tube curare a pure alkaloid in crystalline form d-tubo curarine chloride which became the first standard preparation. Three years later Gill returned from the Amazon and brought with him to the U.S.A. a supply of curare, together with properly labelled specimens of plants used in its concoction. McIntyre investigated the pharmacological action of this in co-operation with Squibb and Son. A purified product was prepared, called Intocostrin, which was used in treatment of spasticity, rigidity, and shock therapy.

As I write these bare words, a picture forms in my mind of the journeyings and adventures of Gill, searching for the secret of the preparation of curare. The preparation for the expedition, the setting out, the engaging of porters, and finally the contacting of the village medicine man. How came Gill to be permitted to watch the preparation of curare? He must be one whom the Indians respected and liked, and one who understood and liked them. However, we cannot all be explorers. Most of us have to make our expeditions at secondhand.

Others before Gill had watched the preparation of curare. In 1821, Humboldt and Bonpland saw it prepared in the Orinoco territory, as did the Schomburck brothers in 1834 in British Guiana. Humboldt claimed that the chief ingredient was a strychnos species of the Loganiaceae. He named the plant "strychnos toxifera," which was the chief constituent of calabash curare. Curarine was separated by Preyer in 1865, and was the first active principle extracted from crude curare. Boehm obtained a 5 per cent. yield of curarine from the bark of strychnos toxifera, and prepared a tertiary nitrogen alkaloid curine in crystalline form.

In 1935, King isolated pure d-tubo curarine chloride from the tube curare, and established it as a bisbenzyliso-quinoline alkaloid, in which the nitrogen atoms were quarternary. He also examined the menispermaceæ and found that the ingredients of tube curare corresponded to the chondodendron.

Gill's curare consists mostly of chondodendron tomentosum, and owes its activity to d-tubo curarine. Intocostrin also owes its activity to d-tubo curarine and contains 20 mgms. of active curare per cc. The American Council of Pharmacy used the rabbit head drop method of assay and found that 1 mgm. of Intocostrin is equivalent to paralysis activity of 0.15 mgm. of d-tubo curarine chloride. Clinically, 1 mgm. of Intocostrin is considered equal to 0.2 mgm. of d-tubo curarine chloride. Doses of 60-100 mgm. are given in anæsthetic practice. The American d-tubo curarine preparation contains 3 mgms. d-tubo curarine per c.c. The English "tubarine" contains 10 mgms. of d-tubo curarine per c.c.

Griffiths and Johnson of Canada in 1944 realised its possibilities and introduced curare into anæsthesia. Since then it has been used regularly by anæsthetists in America and this country.

Now, curare is not an anæsthetic, it is only a muscle relaxant. It acts at the myoneural junction, that is, the place where the nerve end joins the muscle. Muscle contracts as a result of an electrical stimulus passing down the nerve, which

causes the formation of acetyl-choline. This chemical is responsible for the actual contraction. Curare somehow prevents the acetyl-choline from acting on the muscle. The acetyl-choline is formed, but is prevented from exerting its action, and no contraction occurs.

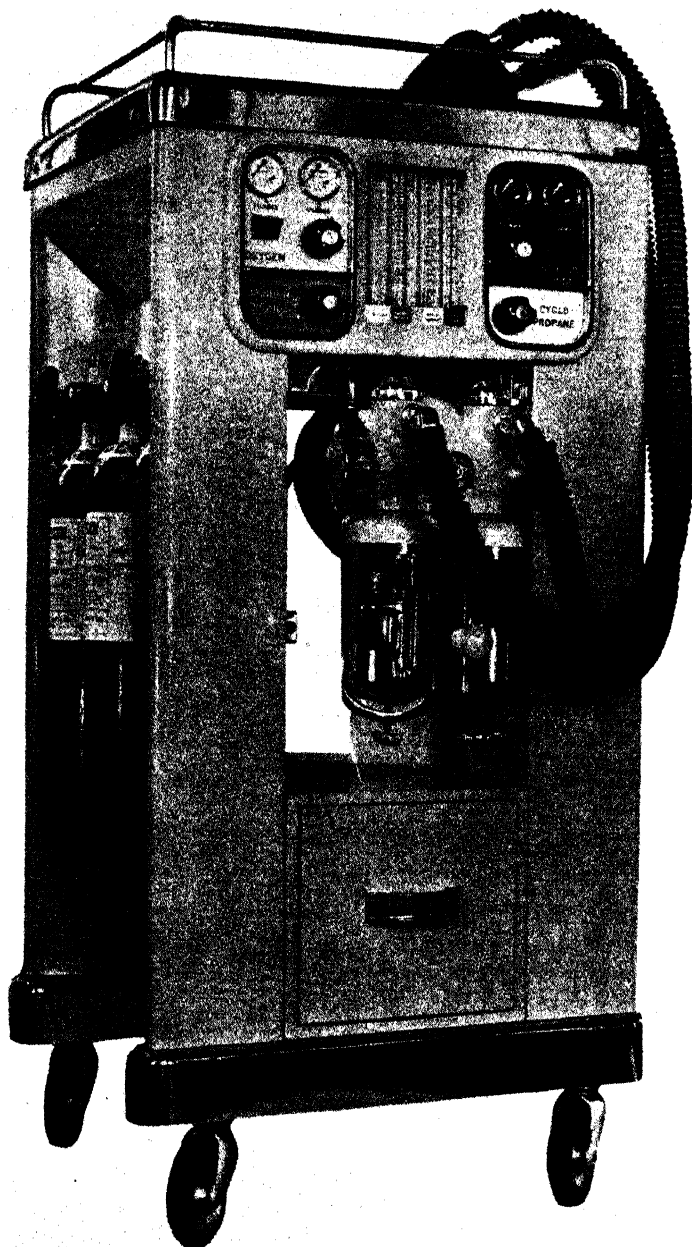
The last word has not been written about the pharmacological action of curare, for anæsthetists have observed that where curare is used the patient seems to be isolated from shock as well. It is as if certain stimuli of an afferent nature, which are carried by the sensory nerves, are also blocked in some manner. It is said that very large doses of curare cause unconsciousness. Certain brave men who are interested in the drug have volunteered to be given increasing doses of it, and their experiences have yielded valuable information. Consciousness is still retained after respiratory arrest. Fortunately for us, the voluntary muscles become paralysed in a definite and progressive order. The facial muscles first, then the limbs, abdominal muscles, and, finally, the muscles of respiration. The intercostals become paralysed before the diaphragm. Thus, we are able to utilise the relaxant effect of curare on the abdominal muscles without causing respiratory paralysis. d-Tubo curarine is sometimes used to cause diaphragmatic quietude, so that the surgeon working inside the thorax can perform his operation more speedily and with more certitude. In these circumstances, the anæsthetist controls the unconscious patient's respiration so as to synchronise with the surgeon's manipulations.

Curare is used as an adjuvant to anæsthesia, and a moderate dose of curare given intravenously, in combination with a comparatively small dose of ether by inhalation or pentothal intravenously, will give the effect in terms of muscular relaxation of deep anæsthesia. This is, of course, of inestimable benefit to the patient, for he does not have to pay the penalty of prolonged deep etherisation, namely, vomiting and a lasting taste of ether, nor does he have the prolonged respiratory depression which tends to follow large doses of intravenous barbiturates.

Curare is a milestone on the road of anæsthesia, and, wisely used, is of inestimable benefit to all engaged in the art of surgery.

OBSTETRIC ANALGESIA

Obstetric analgesia has only been mentioned casually, and deserves a closer hearing. In 1909, Guedel, in the United States of America, made a gas apparatus for the production of analgesia, but to Minnitt of Liverpool the women of this country owe much. For it was he, in 1931, who designed and used a gas-air apparatus for the relief of labour pains. The apparatus has found wide acceptance, and every midwife in the country now receives lectures and instruction in its use. The machine gives relief in both first and second stages of labour, and thousands of women have benefited. Triclorethylene used in Friedmann's Inhaler has been tried for the same purpose, and results are encouraging. Continuous caudal analgesia, with local anæsthetic introduced through the sacral hiatus, has been used by several anæsthetists with success, though statistics indicate that there is a greater proportion of outlet forceps delivery with this method. In labour, the patient is required to be conscious, in order to co-operate in the use of the uterine contractions, so that the aim is analgesia as opposed to anæsthesia, until the actual time of delivery arrives.



By courtesy of British Oxygen Co., Ltd.

A modern gas-oxygen apparatus. The nitrous-oxide is controlled from one panel and the oxygen from the other. Between the panels is a bank of flow meters. Below the flow meters is the Mushin absorber.

BALANCED ANÆSTHESIA

I fear you may be suffering from anæsthetic indigestion, for mention has been made of ether and chloroform, ethyl chloride, nitrous-oxide-oxygen, nitrous-oxide oxygen-ether, cyclopropane, field block, intercostal block, paravertebral block, epidural and spinal block, intravenous pentothal, rectal avertin, rectal ether and finally curare. All these can be used to attain the relaxation so necessary to the surgeon. Why all these methods? Is it just the expression of a desire to be different? It is an attempt to overcome the inherent drawbacks of certain drugs and methods, for by using a combination of drugs and methods it is possible to abolish the unpleasant aftermath of vomiting, headache and nausea. By means of balanced anæsthesia we try to obtain all the advantages with none of the disadvantages. For instance, in a big abdominal operation involving the excision of a large portion of bowel, it has been the custom to use a spinal anæsthetic to give the muscular relaxation and block shock impulses, but the mental stress with spinal anæsthesia alone would be too much to expect the patient to put up with, so intravenous pentothal is used by the drip method to keep the patient asleep. If desired, the pentothal may be given as a single dose, and anæsthesia maintained with gas-oxygen. If spinal anæsthesia be carried to the level of the splanchnic area, the blood pressure falls. This fall can be controlled by the use of analeptic drugs. In certain operations a fall of blood pressure of moderate degree is an advantage, for the patient is not likely to lose so much blood. However, curare combined with pentothal and cyclopropane bids fair to become a serious rival to spinal anæsthesia, but this combination tends rather to increase hæmorrhage, hence its use in such operations as perineo-abdominal excision of the rectum is inadvisable; for this operation the spinal anæsthetic still holds its own. There is another important factor in the choice of anæsthesia and methods—the patient himself. The general condition of the patient has to be considered. Is he bronchitic, does he suffer with poor renal excretion, what is the condition of his cardio-vascular system, what operation is he to undergo, how long will it take, does he suffer from any particular allergy and, finally, what is his mental make-up—apprehensive or indifferent? All these things have to be taken into account before a decision is made as to what anæsthetics should be used.

WHITHER ANÆSTHESIA?

Prophecy is given only to those divinely inspired, and therefore I will not attempt to prophesy. One hundred years ago we were able to confer the blessing of unconsciousness in surgical operations. Surgery then was of the rough-and-ready kind; amputations, cutting for stone, and quick excisions. Through and around them all flowed the "laudable pus"

As the years passed Snow and Clover showed how to attain abdominal relaxation with ether and chloroform, thus abdominal surgery became possible. The abdominal and thoracic surgeon owes a great debt to anæsthesia, for without it abdominal surgery would be impossible. The anæsthetist is like the accompanist, for the audience has come to hear the singer, yet the accompanist can make or mar the performance. The anæsthetist must remain content to play second fiddle or (dare I write it) be the *deus ex machina*.

With the advent of nitrous-oxide-oxygen, the patient's post-operative comfort (or rather discomfort) was improved. Even more so was anæsthesia improved with the advent of avertin rectal basal narcosis. When the intravenous short-acting barbiturates came into being post-operative vomiting declined steeply. Nowadays, it can be said that it is an 80 per cent. chance that the patient will not be sick at all—truly, a great step forward.

I look forward to the day, perhaps not too far distant, when anæsthesia will be but a sleeping and an awakening, and when post-operative pain and discomfort will be abolished. That is what I see written on the signpost of the "Road of Anæsthesia".

OBITUARY

Professor TANCRED BORENIUS. — We regret to announce the death recently of Professor Tancred Borenius, PH.D., D.LIT., F.S.A., Professor of the History of Art at University College, London. Professor Borenius had been a Fellow of the Society since 1936 but resigned in the spring of this year, owing to ill-health.

Borenius was born at Wiborg, Finland, in 1885 and came to England as an art student. In 1913 at the age of twenty-eight he was appointed to the Lectureship in the History of Art at University College. He edited a number of books on painting and from 1940-45 was Managing Director and Honorary Acting Editor of the *Burlington Magazine*. In addition to his interest in painting and art he was an ardent supporter of his native Finland. After the Great War he was, in 1919, the temporary Diplomatic Representative of Finland in this country, and he was an ardent pleader on many occasions for the cause of his country.

GENERAL NOTES

NATIONAL EXHIBITION OF CHILDREN'S ART.—The idea of an open academy of juvenile art is so obvious and praiseworthy that it is surprising that it has only now, through the enterprise of the *Sunday Pictorial*, become a reality. Nearly three hundred paintings and prints chosen by a distinguished committee from upwards of thirteen thousand pictures submitted by schools in Great Britain, remain on view at the Academy Hall, Oxford Street, until today.

"Expressiveness" (as Mr. Herbert Read explains in a preparatory note) was what interested the judges most, the degree of enjoyment expressed in the creations being the only true test to apply. The result, as one would expect, is a lively, colourful show, with imaginative work from all age groups, and several examples of unusual technical accomplishment from older children of fifteen or sixteen. So much may safely be said; but a few astonishingly precocious works—one or two hardly less remarkable, indeed, than Landseer's drawing of a dog, which gained him a Royal Society of Arts' award at the age of seven—should not tempt anyone to make predictions on the insufficient evidence of single, or at the most two, exhibits. Cynthia Pell, who wins a valuable Training Award at the age of fifteen for a monochromatic composition of a figure in a corn-field, may, or may not, have the reputation of a Henry Moore (whom she has evidently studied) twenty years hence; she may, or may not, even be an artist then. All one can say with assurance is that she must have an extremely able teacher at the Hall School, Wincanton, whose impress is no less marked on a rather similar study by another pupil at the school, Mary Newbolt. The exceptionally high standard of the work from Edinburgh also suggests the guidance of an enlightened inspector or teacher in that city, and such influences are discernible elsewhere.

On the other hand, there are a good many chance echoes whose source it would be less easy to trace. A book on modern French painting picked up in the school library, the gift of a monograph on Paul Klee, a visit to the Chagall exhibition—one can very well understand the impact of such novel æsthetic experiences on impressionable minds.

Vivid experiences of this kind must surely account for the hint of Klee in Mary Mundell's contribution (245), the resounding echo of the contemporary School of Paris in the decoration (132) by a group of youngsters, and a *pastiche* of Chagall—complete with ass's head and bizarre figures—rendered with such horrible accuracy by a group of children under ten that one is positively alarmed to think of the misunderstanding that might have arisen if it had found its way into the Tate Gallery last February.

This, then, is an exhibition well worth seeing, which should be enjoyed by everybody—except perhaps the promising lad who must feel that his whole career is blighted by the speculative renderings of his name as "Dirke" and "Duke".

TURNER GALLERIES REOPENED.—Three of the Turner galleries at the Tate, which were damaged during the war, have lately been reopened and hung with a selection of the Gallery's Turners together with a number of others which have been on loan abroad for as long as sixty years and are therefore quite unknown to the London public. This assembly is the more remarkable in view of the Tate's loan of fifty fine Turners to Venice, and among these lesser-known works there are not a few surprises. Naturally no special catalogue of these Turners has been prepared by the Gallery—the display, which will remain on view indefinitely, being little more than a reshuffle of his less-familiar paintings—so that it may be helpful to the intending visitor if I briefly allude to the history of some of them.

Among the surprises are two rare figure studies from the National Gallery's collection—"Woman reclining on a Couch" and "The Letter", both painted in about 1830—in which only the heads have been carried to the stage of completion, the rather awkward compositions being left largely unresolved. These works, of course, are merely a by-product of Turner's art; and though the departure, on the whole, is not a happy one, the more finished study, "The Letter", contains some pleasing passages of colour in spite of its rather tentative construction.

The large renovated Gallery VI (which corresponds to the room where the Turner display was held in September last) has been hung, so far as possible, with the painter's early works. Here are his first exhibited mythological picture, "Aeneas with the Sibyl, Lake Avernus", which has lately been judiciously cleaned and shows clearly the early influence of Claude; the marvellous low-toned "Buttermere Lake", with its rainbow and fitful gleam of light irradiating the distant fields; the dramatic "Destruction of Sodom", which is best observed at some distance (and even so is somewhat obscured by reflections on the glass) and several other choice works of the earlier periods. The later works have, for the most part, been grouped in Gallery VII, where we find some of those great compositions, bathed in golden vapour, which belong to Turner's last refulgent period. Here is the "Mercury sent to admonish Aeneas", veiled in a luminous haze—one of Turner's last radiant pictures, shown in the Academy in 1850—and here too is a wonderfully atmospheric sketch, much earlier but no less imaginative, of Ulysses deriding the giant Polyphemus outlined against the sky.

The small annexe, Gallery VIII, is devoted to Turner's sketches in oils, and one would single out of this valuable collection the note of "Newark Abbey", which reveals a source of Constable's inspiration, "Lake Nemi" with its lovely passages of amber and blue, an exquisite study of "Tree Tops and Sky" and a no less endearing sketch of "Cows in a Landscape".

N. A. D. WALLIS.

NOTES ON BOOKS

"POST-WAR CHURCH BUILDING". Edited by Ernest Short. Hollis & Carter, 1947. 30s.

At this time of prefabrication and war damage repairs it is refreshing to turn to a book of exhortation and conceptional reasoning on all that concerns church building.

We have a great national tradition to live up to and the important thing is that modern ecclesiastical architecture shall be worthy of the national tradition, whatever form it may

assume, when building starts again. Such building demands a loyalty to that Christian spirit which has given us this heritage, coupled with a knowledge of modern needs and building technique. Vital design and good building are in large part measures of a country's well-being, and our future churches can and must lead the way in contributing towards a new pride in architecture, which can once again be an expression of the country's spirit and outlook. Here then is a challenge and an opportunity to public and architects alike for the future. A decline in the quality of a nation's architecture is visible evidence of its economic and moral impoverishment, and the opportunity to prepare for a renaissance of church building is with us to-day.

In editing this practical handbook on Post-war Church Building, Mr. Ernest Short has given us a collection of essays which deal exhaustively with all aspects of church building and the principals mentioned above. He could hardly have chosen a better list of contributors and, in this impressive company, clergy, laity, builders, architects and technicians can gather knowledge of all the problems relating to post-war church building, which will be both of practical use and an inspiration in preparing for the building which is to come. There can be nothing but praise for this book which gives such good opportunity for unified study and brings a sense of reality both spiritual and material to the tasks before all those who are concerned with this work.

To read Mr. John Rothenstein's article, rich in reference and evocation, is a delight and an education. As an introduction to the subject it could not be bettered and its literary style is a joy. All those who are concerned with church building should be under an obligation to read it. As a layman, he rightly adjures all to make constructive and generous use of all available talent. The importance of this advice cannot be too often stressed. Time and again the opportunity to produce fine architecture has been tragically missed by the wrong choice of architect, artist or craftsman. In regard to design he quotes Geoffrey Scott's wise and realistic definition of the art of architecture as "humanised dynamics", but all will not subscribe to his pronouncement on page 8 on the new conceptions in church architecture, although it will do some architects no harm to weigh his words, and it is clear that he is not advocating a habit of frozen or exact reproduction.

Prebendary Eley's contribution has an exhilarating heading, "The Great Adventure—A New Church". It includes some helpful and sound advice to the layman. Similarly all who have been impressed by his contribution to Church Architecture will read Mr. Cachemaille-Day's article with care and interest.

Sir Charles Nicholson's three chapters command our attention, as much for his interesting summary relating to the planning, styles, and requirements of churches in general as to his chapter on the English Church and its surroundings. I hope that he may wish to revise his remarks in the next edition as to the rather vague functions of the Royal Fine Arts Commission, whose terms of reference are in fact clearly defined.

Mr. Hope Bagenal is always a joy and an inspiration to me. To listen to him or to read his words is to be refreshed and invigorated. He is himself akin to a musical instrument, and there is a lyric quality about all he says and does. His commentary and sound practical advice on church acoustics should be read by all concerned.

In writing on modern stained glass Miss Guillum Scot has a difficult task. She gives us good sound advice. But there is a paucity of good stained glass artists to-day and the use of stained glass in new churches should not, as Miss Scott says, "be left to the whim of a donor, but resorted to only after the most careful thought and in consultation with the architect". Her article will go some way in guiding those who are perplexed over this difficult problem. Her chapter on Church Plate is interesting.

Mr. Geoffrey Webb speaks with knowledge on Church furnishings, a fascinating subject. And all will read Mr. Francis Ele's chapter knowing that here is a devoted worker in the cause of church design with long experience and personal knowledge of practically all the problems dealt with in the book. Few will quibble in general with his

counsel to respect the framework of the liturgical use of the Church, always provided it doesn't prevent real and vital progress.

There is not space to refer in detail to all the articles in this valuable and comprehensive publication, but it should be stated that the book would not be complete without the articles on bells and bell towers, and the difficult and essential question of heating and ventilation which Colonel Bertram Shore rightly states "are not really dull or prosaic subjects"; and the all-important question of church lighting, over which there is some controversy. Of the chapter on the organ, Mr. Freeman wisely says that "no worthwhile tradition will have been broken should it be decided to plan both choir and organ at the west end or in any other effective position". To this we heartily subscribe. And lastly—Mr. Williams has some sound advice to offer on Church Woodwork.

All concerned with post-war church building, I feel, will be grateful to the general Editor. The essays all combine to show us the need of a loyalty to the Christian spirit, which like a golden thread must run through all the problems, historical, economic, practical, æsthetic and psychological which are met with in the building of a church, and all will agree that post-war building must possess integrity. It sums up in one word the aims of every true architect, and this is fully brought out in the essays. The illustrations admirably illustrate the text. In church building a country can rise to the highest expression of man's genius, and we believe that this book will help in no small measure towards this ideal.

A. B. KNAPP-FISHER.

LIBRARY ACCESSIONS DURING SEPTEMBER, 1948

Lists of accessions to the Library will be published in the *Journal* at regular monthly intervals. Items marked with an asterisk are for reference purposes and cannot normally be borrowed.

EXHIBITIONS

*ART TREASURES EXAMINER.

A pictorial, critical and historical record of the Art-Treasures Exhibition at Manchester in 1857. Manchester [1857].

*COMMISSIONERS FOR THE EXHIBITION OF 1851.

Reports 3rd-9th. 7 Vols. H.M.S.O. 1856-1935. (Presented by the Commissioners.)

*DUBLIN.

The exhibition expositor and advertiser (Irish Industrial Exhibition, Dublin, 1853). Dublin, 1853.

*PRESS CUTTINGS.

Large folio volume of press cuttings relating to the Great Exhibition of 1851 and the International Exhibition of 1862. (Presented by Mr. Charles E. Lee.)

*SYDNEY.

Official record of the Sydney International Exhibition 1879. Sydney, 1881.

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Ancilla to the pre-Socratic philosophers. Blackwell. 1948.

SOCIAL SCIENCES

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On human finery. Hogarth Press. 1947.

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English costume of the early middle ages. Black. 1936.

English costume of the age of Elizabeth. Black. 1938.

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Birds of the hedgerow, field and woodland. Herbert Jenkins [1947].

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Canada moves North. Hurst and Blackett [1947].

PALMER (ARNOLD), *ed.*

Recording Britain. Vol. III. O. U. P. 1948.

ROWNTREE (KENNETH) and JONES (GWYN).

A prospect of Wales. Penguin Books [1948].

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Grand perspective. Contact Publications [1948].

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, OCTOBER 11. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture I.

Purchasing Officers Association, at the Royal Society of Arts, W.C.2. 6.15 p.m. W. Gildon, "The Achievements and Aims of the Purchasing Officers Association."

TUESDAY, OCTOBER 12. Industrial Transport Association, at the Grand Hotel, Broad Street, Bristol. 7 p.m. E. A. W. Goodchild, "Vehicle Repairs."

Manchester Geographical Society, 16 St. Mary's Parsonage, Manchester, 3. 6.30 p.m. J. M. Wordie, "Explorations in Graham Land and the Falkland Island Dependencies."

Textile Institute, at the Midland Hotel, Bradford. 7 p.m. J. Foster Reaver, "The Romance of Wool."

WEDNESDAY, OCTOBER 13. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture II.

Sanitary Institute, Royal, 90 Buckingham Palace Road, S.W.1. 2.30 p.m. E. B. Anderson, "The Control of Milk Quality."

Textile Institute, at the Mechanics' Institute, Burnley 7.15 p.m. H. L. Muschamp, "Automatic Weft Replenishing by Lancashire Loom Conversion."

THURSDAY, OCTOBER 14. Chemical Society, Burlington House, W.1. 7 p.m. (1) R. D. Haworth, J. McKenna and N. Singh, "The Constitution of Conessine." (2) G. Dunn, J. J. Gallagher, G. T. Newbold and F. S. Spring "The Antibacterial Compound Aspergillite Acid."

At the University, Liverpool. 4.30 p.m. Dr. A. J. Rudge, "The Preparation, Properties and Handling of Elementary Fluorine."

At the University, Manchester. 6.30 p.m. Professor R. A. Morton, "Biochemistry of Vitamin A."

Petroleum, Institute of, at Manson House, 26 Portland Place, W.1. 5.30 p.m. K. B. Ross and D. N. McKinlay, "Integration of Operations in a Large Refinery."

FRIDAY, OCTOBER 15. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture III.

Engineers, Junior Institution of, 39 Victoria Street, S.W.1. 6.30 p.m. L. P. Corté, "Sound and Vibration Measurements."

Mechanical Engineers, Institution of, S.W.1. 6 p.m. Mansergh Shaw, "Technical Adventures in Australia."

MONDAY, OCTOBER 18. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture IV.

Chemical Industry, Society of, Burlington House, W.1. 5.30 p.m. R. S. Morse, "Recent Developments in High Vacuum Technology."

Chemical Society, at the Physical Chemistry Laboratory South Park Road, Oxford. 8.15 p.m. Dr. A. D. Walsh, "Aspects of Vapour Phase Oxidation."

Electrical Engineers, Institution of, at the Liverpool Royal Institution, Colquitt Street, Liverpool. 6.30 p.m. A. R. Cooper, "Load Dispatching and the Reasons for it, with special reference to the British Grid System."

TUESDAY, OCTOBER 19. Chemical Society, at the Municipal College, Portsmouth. 7 p.m. Dr. F. P. Bowden "Tribochemistry and the Initiation of Explosives."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. S. J. Moss and G. C. F. Whittaker, "What Should be the Design Consideration of Services' Radio Equipment."

At 1 Whitehall Road, Leeds. 6.30 p.m. W. Bowen, "Factors Governing Specifications for Flexible Electric Cables."

At the Y.W.C.A. Nottingham. 6.30 p.m. C. A. Cameron Brown and E. W. Golding, "The Application of Electricity to Horticulture."

Manchester Geographical Society, 16 St. Mary's Parsonage, Manchester, 3. 6.30 p.m. Mrs. Hugh Lee, "Our Official Visit to Canada."

Physics, Institute of, at the University, Glasgow. 7 p.m. Professor D. I. Dee, "The Future of Physics."

Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 6.30 p.m. G. D. Robinson and F. Hollands, "Trend of Development in America."

Textile Institute, at the Memorial Hall, Macclesfield. 8 p.m. A. W. Roberts, "Mass Production of Quality Clothing—From the Loom to the Public."

WEDNESDAY, OCTOBER 20. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture V.

Physics, Institute of, 47 Belgrave Square, S.W.1. 5.30 p.m. Dr. G. D. Rochester, "Cosmic Rays."

At the University College, Cardiff. 4.15 p.m. Dr. A. J. C. Wilson, "Geiger Counter X-ray Analysis."

THURSDAY, OCTOBER 21. Chemical Society, at the North British Station Hotel, Edinburgh. 7.30 p.m. Professor J. W. Cook, "Some Aspects of the Chemistry and Biochemistry of Polycyclic Aromatic Hydrocarbons." At the University College, Hull. 6 p.m. Dr. A. E. Alexander, "Surface Chemistry—its Achievements and its Future."

Textile Institute, at the College of Technology, Belfast 7.30 p.m. F. Millard, "The Properties and Uses of Nylon Fabrics."

At the University, Leeds. 7.15 p.m. E. V. Giles, "Application of Plastics to the Textile Industry."

At 16 St. Mary's Parsonage, Manchester, 3. 7.15 p.m. H. W. Best-Gordon, "Chemical Aids to Textile Processing and Finishing."

FRIDAY, OCTOBER 22. Arts, Royal Academy of, W.I. 4 p.m. Professor H. J. Plenderleith, "Craftsmanship and Painting." Lecture VI.

Chemical Society, at the University, Edgbaston. 4.30 p.m. Sir Cyril Hinshelwood, "Cell Growth Phenomena and Chemical Kinetics."

Engineers, Junior Institution of, 39 Victoria Street S.W.1. 6.30 p.m. Stanley L. Lyons, "The Influence of Lighting on Industrial and Domestic Accidents."

Physics, Institute of, at the University, Manchester. 7 p.m. H. L. Kirke, "Studio Acoustics and Modern Methods of Measurement."

Sanitary Institute, Royal, at the Council Chambers, Poole. 10 a.m. (1) Lord Llewellyn, "Food and Health." (2) Dr. G. J. G. King, "Food and Disease." (3) R. Leggat, "The Chlorination of Sewage Effluents."

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During the Second World War Westcroft Mill provided yarn for Service blankets and garments, and Spring Hall Mills wove cloths for West Africa whence Britain obtained rubber, palm kernels and oil.

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4780

FRIDAY, OCTOBER 22, 1948

VOL. xcvi

OPENING OF THE 195TH SESSION, 1947-48

The first meeting of the new Session will be held at the Society's House at 2.30 p.m. on Wednesday, November 3rd, when the Inaugural Address on "The Society and the Commonwealth" will be delivered by Sir Harry Lindsay, K.C.I.E., C.B.E., Chairman of the Council. After the Chairman's address, an R.D.I. Diploma and Silver Medals will be presented. Tea will be served at the conclusion of the proceedings in the library, and it is hoped that recently joined Fellows may be able to take this opportunity to meet the Chairman and Members of Council of the Society.

(A complete provisional list of the meetings so far arranged is included loose as a supplement to this issue of the *Journal*.)

"DESIGN AT WORK" EXHIBITION

The "Design at Work" Exhibition, sponsored by the Royal Society of Arts and the Council of Industrial Design, will be opened on October 26th by Her Royal Highness The Duchess of Kent. A full report of this ceremony will be included in the next issue of the *Journal*. The Exhibition will be open to visitors from the morning of October 27th and will remain open until November 28th. (Times of opening are 10 a.m.-7 p.m. weekdays, 2 p.m.-6 p.m. Sundays).

DISBANDING OF THE WAR MEMORIALS ADVISORY COUNCIL

The Council of the Royal Society of Arts have agreed to the disbandment of the War Memorials Advisory Council, as few new memorial projects are now likely to be initiated.

The Advisory Council was formed towards the end of 1944 to give guidance to local authorities and others in connection with their War Memorials schemes, with the object of raising the standard of such memorials throughout the country. Much valuable work has been done in this direction, but a great many projects are held up, owing to building and other restrictions. It is certain, however, that the advice and assistance which the Council have given will have a lasting and salutary influence on the future design of war memorials.

However, one of the Council's chief ambitions—the establishment of a National War Memorial—remains unfulfilled. The Government were adamant in their decision not to proceed with any plan until the public demanded it, while the Council's attitude all along has been that it was for the Government to give the nation a lead. Strenuous efforts by the Council, including the raising of two Motions on the subject in the House of Lords by Lord Chatfield, its President, and a deputation to the Prime Minister, failed to change Government opinion.

The Royal Society of Arts wishes to place on record its high appreciation of the valuable services rendered by Admiral of the Fleet Lord Chatfield, the President of the War Memorials Advisory Council, and Mr. A. R. N. Roberts, its Honorary Secretary, both of whom have held office since its inception, and as a mark of their gratitude the Council of the Society have awarded medals to them.

The thanks of the Society are also due to the Pilgrim Trust for the very generous contributions which they made to the funds of the Advisory Council.

Correspondence on matters relating to War Memorials should, in future, be addressed to the Secretary of the Society, who will arrange so far as possible for a continuance of the advisory service of the Advisory Council.

MEETING OF COUNCIL

A meeting of Council was held on Monday, the 11th October, 1948. Present: Sir Harry Lindsay (in the Chair); Lord Aberconway; Mr. F. H. Andrews; Sir Frank Brown; Major W. H. Cadman; Sir Atul Chatterjee; Sir Thomas Dunlop; Sir Angus Gillan; Mr. John Gloag; Mr. E. W. Goodale; Dr. R. W. Holland; Mr. Peter Le Neve Foster; Mr. G. K. Menzies; Mr. F. A. Mercer; Mr. J. W. Ramsbottom; Mr. E. M. Rich; Mr. A. R. N. Roberts; Mr. E. Munro Runtz; Mr. William Will; Mr. J. G. Wilson and Miss Anna Zinkeisen; with Mr. K. W. Luckhurst (Secretary) and Mr. C. J. Buchanan-Dunlop (Assistant Secretary).

The following candidates were duly elected Fellows of the Society (this is the first list to be issued since last July):

Adamson, Donald Colin Malcolm, F.R.I.C., Greenford, Middlesex.
 Alexander, Owen Morley, Banbury, Oxfordshire.
 Armstrong, Richard Giles, Wrotham, Kent.
 Artzybasheff, Boris, New York, U.S.A.
 Atchison, Joseph Anthony, Washington, U.S.A.
 Attwood, Charles Ernest, B.Sc., Barking, Essex.
 Avinoff, Andrey, LL.M., SC.D., L.H.D., New York, U.S.A.
 Ayres, Mrs. Martha Oathout, California, U.S.A.
 Bacon, Archibald, London.
 Baker, John Lawrence, D.A., London.
 Barlow, Edward Ernest, A.R.I.B.A., Harrow, Middlesex.
 Bartley-Denniss, Lieut.-Col. Cyril Edmund, D.S.O., Faversham, Kent.
 Bates, Richard James, London.
 Bedale, Rear-Admiral (E) Sir John Leigh, K.B.E., C.B., Angus, Scotland.
 Behrens, Miss Ethel, London.
 Bhoir, Shantaram Rajaram, Bombay, India.
 Bird, Ronald Edward, Thurmaston, Leicestershire.
 Bishop, Samuel George, Stourbridge, Worcestershire.
 Booth, Major Sir Paul M., D.L., M.I.MECH.E., Burnham-on-Crouch, Essex.
 Bowater, Sir Eric Vansittart, West Horsley, Surrey.
 Bowden, Sir Harold, BT., G.B.E., Ruddington, Notts.
 Bowdler, William Audley, M.R.C.S., L.R.C.P., Fromes Hill, Herefordshire.
 Brightwell, Stanley T. P., M.Sc., A.R.C.S., D.I.C., Croydon, Surrey.
 Brooke, Miss Iris, A.R.C.A., Dalwood, Devon.
 Bull, Eric William, M.Sc., A.M.I.E.E., Hounslow, Middlesex.
 Burgess, Geoffrey Cave, B.Sc., A.R.I.C., Ph.C., Ilkley, Yorks.
 Carlini, Horace Alfred, Westcliff-on-Sea, Essex.
 Carroll, Joseph John, B.A., Bulawayo, S. Rhodesia.
 Charlton, George, London.
 Cheavin, Ian Winston, London.

- Cherry-Garrard, Apsley George Benet, London.
Chiang, Yee, B.Sc., Oxford.
Christie, John Traill, London.
Conant, Professor Kenneth John, M.Arch., Ph.D., Litt.D., Massachusetts, U.S.A.
Condliffe, Professor John Bell, M.A., D.Sc., California, U.S.A.
Cooke, Roland Cecil, Cobham, Surrey.
Cooke, Captain Ernest John, Angus, Scotland.
Coombs, Fred William, A.I.E.E., Hounslow, Middlesex.
Cording, Miss Ethel Mary, Bristol.
Corté, Leonard Pierre, Aylesbury, Bucks.
Crawshaw, Frank Mackenzie, M.A., LL.B., M.B., Epsom, Surrey.
Cundy, Alan Ernest, A.R.C.A., Leicester.
Davey, Edward Clarence, London.
Day, Mrs. D. Lucienne, A.R.C.A., London.
Digby, George Fredrick Wingfield, London.
Dodd, Ronald Fielding, F.R.I.B.A., Oxford.
Dodson-Wells, George, M.B.E., Farnborough, Kent.
Doudney, Henry Eric John, London.
Douie, Charles Oswald Gaskell, Bosham, Sussex.
Dunn, Henry Conrad, B.Sc., Ph.D., Liverpool.
Egeland, Leif, LL.D., M.A., B.C.L., London.
Elias, Taslim Olawale, LL.M., London.
Englander, A. Arthur, London.
Fermor, Sir Lewis Leigh, O.B.E., D.Sc., F.R.S., Bristol.
Fletcher, Geoffrey Scowcroft, D'A., London.
Fox, Raymond Charles, B.Sc., Ph.D., A.M.I.E.E., Barnstaple, Devon.
Gardiner, Gerald, A.R.C.A., Stroud, Glos.
Gelsthorpe, Ronald William, Batley, Yorks.
Gibbs-Smith, Charles Harvard, M.A., London.
Gibson, George, M.A., Mus.Doc., Dunoon, Argyllshire.
Gibson, William Pettigrew, B.A., Hertfordshire.
Gilchrist, Peter, M.Com.Sc., Co. Down, Northern Ireland.
Gillard, Leslie Pullen, Aldershot, Hants.
Goodale, Miss Sylvia Frances, Tadworth, Surrey.
Gross, Richard Oliver, C.M.G., Auckland, New Zealand.
Guthrie, William Tyone, B.A., London.
Hamilton, George Black, B.Sc., Transvaal, South Africa.
Hammond, Harry William, A.M.I.Mech.E., Colombo, Ceylon.
Harmer, Charles Albert Walter, O.B.E., Cambridge.
Harris, Frank Chambers, A.R.I.B.A., J.P., Boragas, Ceylon.
Harwood, John Hammond, A.R.C.A., Sheffield.
Hassall, Miss Joan, R.E., London.
Hebbs, Lewis Goodin Spire, F.R.I.C., Arlesey, Bedfordshire.
Hennes, Hubert, A.R.C.A., Oxford.
Hensman, John Edward Ratnam, M.A., D.I.C., Colombo, Ceylon.
Heymans, Paul Adolphe Alphonse, D.Sc., Brussels, Belgium.
Hodge, Francis E., R.I., R.O.I., London.
Houseman, Gordon, M.R.C.S., L.R.C.P., Tring, Herts.
Howard-Jones, Miss Rosemary, London.
Humphreys, Thomas Denis, Little Marlow, Bucks.
Jones, Frederick Stansfeld, Stoke-on-Trent, Staffs.
Jowitt, Harold, C.M.G., M.Ed., B.A., Mafeking, South Africa.
Junge, Carl Stephen, Illinois, U.S.A.
Jungeblut, Professor Claus Washington, M.D., New York, U.S.A.
Juran, Professor Joseph M., B.S., New York, U.S.A.
King, Hector Athol, Solihull, Warwickshire.

- Knight, Eric Frank Walter, Hartlepool, Co. Durham.
Lal, Mukandi, B.A., Bareilly, India.
Leader, Reginald Albert, M.R.C.S., L.R.C.P., D.P.H., Ipswich, Suffolk.
Leslie, James Patrick, B.Sc., M.I.C.E., Johannesburg, South Africa.
Loiseau, Louis Marie Jean, Paris, France.
McCabe, Anthony, Droylsden, Lancashire.
McCoubrey, John, B.COM., Co. Antrim, Northern Ireland.
Mackarness, Cuthbert George Milford, C.I.E., Willingdon, Sussex.
Mackenzie, James Grant, Johannesburg, South Africa.
Macmorland, Arthur, Troon, Ayrshire.
Maddison, John, M.D., D.P.H., Hampton Hill, Middlesex.
Marlow, Reginald Herbert, A.R.C.A., London.
Mayne, General Sir Ashton Geiard Oswald Mosley, G.C.B., C.B.E., D.S.O., London.
Maung, Dr. Maung, Rangoon, Burma.
Medley, Sir John Dudley Gibbs, M.A., Melbourne, Australia.
Merritt, Albert Victor, A.R.C.A., New Malden, Surrey.
Metcalfe, Samuel Brownlow, Co. Armagh, Northern Ireland.
Mills, Reginald William Clifford, Aylesbury, Bucks.
Mirfield, Clarence Arthur, A.R.C.A., London.
Missingham, Harold, Sydney, Australia.
Money, Reginald William, M.Sc., F.R.I.C., London.
Moss, Charles Geoffrey, London.
Moss, Noel V., London.
Mullins, George Norman, Shackleford, Surrey.
Munro, Professor Thomas, A.M., Ph.D., Ohio, U.S.A.
Murray, Professor Margaret Mary, D.Sc., London.
Norrie, H. E. Lieut.-General Sir Charles Willoughby Moke, K.C.M.G., C.B., D.S.O., M.C., Adelaide, S. Australia.
Ó'Raghallaigh, Professor Tomás, M.A., Ph.D., Galway, Eire.
Orrell, William Ramsden, B.Sc., F.R.I.C., Maidstone, Kent.
Orr Ewing, Ian Leslie, M.P., Christon, Somerset.
Orton, Professor James Herbert, D.Sc., F.R.S., Liverpool.
Owen, Leonard, C.I.E., M.A., Gerrards Cross, Bucks.
Oxford, Desmond de Villiers, Gatooma, S. Rhodesia.
Paine, Frank Albert, B.Sc., A.R.I.C., London.
Palmer, Major Edward Henry Banks, O.B.E., London.
Pattison, Philip Ryder, M.B.E., Calcutta, India.
Pavière, Sydney Herbert, F.S.A., Preston, Lancs.
Pearce, Sir George Alfred, Ruislip, Middlesex.
Phillips-Howard, Basil Adrian, A.R.I.B.A., Burnham, Bucks.
Pillai, C. Swaminatha, Bombay, India.
Rayner, Donald Lewis, Marple, Cheshire.
Reeves, Sidney Herbert, London.
Regan, Daniel, B.A., B.Sc., M.B., D.P.H., London.
Rice, Lieut-Colonel James Frederick, M.B.E., B.ENG., Aldershot, Hants.
Rodgers, Howard Duncan, Chapeltown, Sheffield.
Rodgers, John, B.A., London.
Rose, Professor Lisle Abbott, M.A., Ph.D., Illinois, U.S.A.
Ross, Professor Alexander David, M.A., D.Sc., DIP.ED., Nedlands, Western Australia.
Ross, Stuart Grahame, Aldingbourne, Sussex.
Santonna, Arthur Jean, Jubbulpore, India.
Satchwell, William Leonard, Bristol.
Sewell, Brian Constantine, Twickenham, Middlesex.

Silvercruys, Miss Suzanne, Connecticut, U.S.A.
Simpson, Desmond Harry, Stourbridge, Worcs.
Sinton, John Lawrence, London.
Sparer, Major John, New Jersey, U.S.A.
Stanley, Brian Taylor, M.A., Newcastle-upon-Tyne.
Stead, Professor Gilbert, M.A., D.Sc., Kingswood, Surrey.
Steinman, David Barnard, B.S., A.M., C.E., Ph.D., New York, U.S.A.
Stewart, Arthur Hay, Glasgow, Scotland.
Stewart-Liberty, Arthur Ivor, M.C., B.A., Great Missenden, Bucks.
Stoll, Professor Arthur, D.Sc., Basle, Switzerland.
Stone, Rear-Admiral Ellery Wheeler, D.S.M., K.B.E., New York, U.S.A.
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Tod, Murray Macpherson, A.R.E., A.R.C.A., Dalbeattie, Scotland.
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Tunncliffe, Charles Frederick, A.R.A., R.E., Anglesey.
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Velarde Bergmann, Professor Héctor, Lima, Peru.
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Vissanji, Sir Mathuradas, D.LITT., Bombay, India.
Von Post, H. E. Claës Eric Axelsson Thuröe, Ankara, Turkey.
Waddington, Norval Ralph, B.A., New York, U.S.A.
Wadham, Professor Samuel MacMahon, Victoria, Australia.
Wale, Sydney David, London.
Watson, Alexander, A.M.C.T., A.M.I.E.E., Darwen, Lancs.
Watson, Frederick John, Wattisfield, Suffolk.
Wenger, Major Henry Cecil, B.A., T.D., Aston-by-Stone, Staffs.
Whiteside, Joseph Thomas, A.R.C.M., Preston, Lancs.
Williamson, Thomas Arthur, Welling, Kent.
Wilson, David Woodburn, M.Sc., London.
Wilson, Edward Arthur, Massachusetts, U.S.A.
Wokes, Frank, Ph.D., B.Sc., F.R.I.C., Ph.C., King's Langley, Herts.
Wormell, Lawrence John, Gainsborough, Lincs.

The following candidate was duly elected an Associate of the Society:

Abel, Miss Rosemary Anne, London.

The Chairman reported the progress made in the preparations for the "Design at Work" Exhibition and read a letter of encouragement from Her Royal Highness The President.

The Silver-Gilt Medal of the Society was awarded to Lord Chatfield and the Silver Medal to Mr. Roberts in recognition of their services as President and Honorary Secretary respectively of the War Memorials Advisory Council.

The resignation of the Assistant Secretary was accepted.

It was agreed to make a donation of 50 guineas to the Crafts Centre appeal.

A quantity of formal and financial business was also transacted.

CO-ORDINATION OF RESEARCH IN THE PACIFIC

By E. MARSDEN, C.M.G., C.B.E., M.C., D.Sc., F.R.S.,
Scientific Adviser to the New Zealand Government

Dominions and Colonies Section, Tuesday, March 16th, 1948

Mr. PATRICK GORDON-WALKER, M.A., B.LITT., M.P., *Parliamentary Secretary for Commonwealth Relations, in the Chair*

THE CHAIRMAN: I have the pleasure of introducing Dr. Marsden to you. He is going to talk about a very wide-ranging subject: the co-ordination of research in the Pacific. I must admit that I am not quite sure yet what that includes and excludes, and I found myself in an even greater difficulty, when I looked through Dr. Marsden's many honours, because I found that he could treat this subject from a very wide number of angles. It seems to me that it would be impossible to find anyone better equipped to deal with this subject than Dr. Marsden, who has had dealings of almost every conceivable kind with the various aspects of research in the Pacific. Until this last year he had two posts to fill, either of them I should have thought, enough for a vigorous man. One was the Secretaryship of the Department of Scientific and Industrial Research in New Zealand, which he had held since 1927, and the other was Directorship of Scientific Development for the New Zealand Defence Forces. From 1922 to 1927 he was Assistant Director of Education in New Zealand.

Nearer home he was a lecturer in physics at London University, a John Harling Fellow, University of Manchester and, perhaps as the most valuable experience of all, he worked with Lord Rutherford. There are two particular qualifications which I very much envy, and one of which I will certainly not be able to achieve. The first is that Dr. Marsden has visited all the Pacific islands under New Zealand mandate. That, I think, is a blissful occupation. I understand that what he did in the Pacific islands, among other things, was to have close and frequent discussions with the Fijian scientific workers. Whereas one day I might emulate Dr. Marsden in going round the Pacific islands under New Zealand mandate, I know that I will not be able to equal him in acquiring what I regard as one of the two or three great scientific honours, namely, the Fellowship of the Royal Society.

I have given you a bare list of Dr. Marsden's qualifications, which shows you, as I say, that he could deal with this problem from a wide variety of approaches, and I think I had better leave you now to listen to him to see how he is going to deal with the problem.

The following paper was then read:

I appreciate very much the honour of being asked by your President to address you to-day. I must confess, however, a sense of inadequacy in dealing with the subject compared with someone, say, from the Colonial Office or from Australia, since I realise that it is a subject that needs continuous and intensive study. We in New Zealand have not perhaps been so "extra territorially" minded and have not studied these questions so much.

The Pacific is a huge ocean and distances between the main countries bordering it are huge compared with European standards. At the Equator where the degrees of longitude are great in distance, we have, between Java and South America, 160 of the world's 360 degrees of longitude. The distance from San Francisco to Tokyo is 4,500 miles, Auckland to Panama 6,600 miles, Sydney to Victoria 6,900 miles, Panama to Wellington 6,600 miles, Honolulu to San Francisco 2,100 miles, Sydney to Tokyo over 4,000 miles, New Zealand to Australia 1,200 miles. Compare these figures with the distance from Europe to America.

In and bordering this Pacific Ocean are thousands of islands ranging in size from New Guinea and Borneo, the largest sub-continental islands in the world, down to dots of palm-covered coral a few acres in extent. In general there are three kinds of Pacific or tropical islands, the volcanic peak or range surrounded by a coral reef, e.g., Fiji, New Guinea (soil fertility is related to the kind of volcanic outpouring, basaltic, andesitic, etc., and whether ash showers are involved); the coral mass which has been built up to a height of a few hundred feet by subterranean force; and the atoll, which is simply a coral reef roughly circular in shape enclosing a lagoon instead of a land mass, and along which reef there are palm-covered islets often miles long but seldom exceeding 400 yards in width, e.g., the Line Islands. These look like fairyland from the air above with the varying colour of water from green to Reckitts' blue.

Within these tropical islands are thousands of square miles of fertile land and millions of people divided into more than twenty separate governments or administrations. There is hardly one completely independent country among them; they are, or were, the possessions or protectorates of Great Britain, France, the United States, Netherlands, Japan (if we leave her any), Australia or New Zealand.

The countless islands and archipelagos of the tropical portion of the Pacific have been from time immemorial the home of different types of seafaring people, who appear to have come into the Pacific from the general direction of south-east Asia in a series of waves. The tracing and dating of these migratory waves has occupied the attention of anthropologists for over a century, but only very recently has any general agreement been reached and as the result of the work of the last ten years, including incidental but important observations arising from war-time occupation, we may expect that most interesting information on these questions will emerge.

When Europeans began to invade the Pacific, it was divided between the comparatively cultured Polynesians of the mid-eastern Pacific and the primitive Melanesians of the western and north-western Pacific, with Micronesians (i.e., a mixture of Polynesian and Melanesian blood) along the centre and Indonesians in the north west (Philippines, East Indies, Borneo, etc.).

The first Europeans to enter the Pacific were the Portuguese and Spaniards, the former journeying to New Guinea in 1511. Drake did not begin his exploration of the Pacific until his voyages of 1577-80. Then followed the Dutch, and Tasman, in 1642-43, discovered Tasmania and New Zealand, Tonga, Fiji, New Britain, etc. He was followed by Dampier, who circumnavigated New Guinea in 1686 and later visited Australia.

It was left to Captain Cook, however, in three voyages between 1768-80 to explore thoroughly the South Pacific, discovering and naming in particular Cook Islands, Niue, Hawaii, Tonga, New Hebrides, New Caledonia and many of the islands in the Society and Marquesas groups. There followed La Perouse's voyages in 1785-88, the first British settlement in Australia in 1787 and the first settlement in New Zealand in 1825. British sovereignty in New Zealand was proclaimed in 1840, French in New Caledonia in 1853, Germany carried out operations in Samoa in 1868-80

Britain annexed Fiji in 1874. A republic was set up in Hawaii in 1894 (now a State of U.S.A.). I take it we may in future expect the U.S. to be more interested in the Pacific in an effort to keep it Pacific in both senses of the word.

In 1919-20 the former German colonies in the Pacific were handed over as "C" class mandates, New Guinea to Australia, Western Samoa to New Zealand, Caroline, Marshall and Mariana Islands to Japan, Nauru, the phosphate island, to Britain, Australia and New Zealand jointly. In 1935 the Philippines were created a semi-independent Commonwealth by the United States, with promise of becoming an independent republic in 1946.

On December 7th, 1941, Japan struck at Pearl Harbour, etc., and the Pacific was for the first time involved in global war, following a decade of Japanese underground movements and deliberate preparations which were fully appreciated locally in their clear parts of a deliberate pattern, but which invoked no response at the time in the seats of power in London, Washington, Paris, etc.

I need not recount in review the history of the war, nor is it the time and place to indicate the successes of the United States, Australia and, to a certain extent, New Zealand. What is more important is the still unsettled terms of the peace. The Japanese still like to think that their land forces were not defeated. Japan's population is still increasing. As the defeated nation she is more likely to apply the lessons of war than are the victors. Surely in the midst of preoccupation with local European developments we need to exercise statesmanship rather than expediency in the settlement of the Japanese question, so that the peoples of the Pacific may lose the sense of fear, as a new generation grows up which loses perspective regarding the primæval ruthlessness of the Japanese and just what war means with them as the aggressor. These matters are, of course, outside our consideration this evening, except as emphasising a background need for increased strength in the smaller and more backward countries, so that collectively they can resist and, because of their combined strength, prevent such an outbreak in the future. If the peoples of each of the countries in the Pacific are progressing steadily towards higher standards of living and of life, they should be less receptive to the insidious propaganda which preceeded the Japanese invasion of 1942.

There are, of course, many questions of principle to decide. For instance, I remember many years ago making an investigation of the orange industry in Rarotonga. The money received in New Zealand from export oranges was an important part of the revenue on which Rarotonga depended for the upkeep of medical and social services. The orange trees were mostly old, growing in native clearings on the edge of the bush. Inevitably disease could not be sufficiently controlled under these conditions ; inevitably grading and uniform types were difficult to obtain and a large wastage was involved in transport. It was obvious from investigation that very much more revenue would be obtained if orderly citrus groves of newer varieties were established, which could be sprayed effectively and economically. This involved modification of land tenure, co-operative communal labour and good technical management. The question arose as to whether we could be justified in applying the logical outcome of our scientific findings. Did the Rarotongans really want it? Was the price of improvements, according to our way of thinking, really worth the social readjustment necessary?

Again, recently in Samoa we urged similar modification of local agriculture and food production methods, better to meet the needs of an increased population (95 per cent. since 1921) and obtain the wherewithal for higher standards of living. The Samoan leaders had perhaps not been sufficiently educated in Western scientific methods to demand these changes themselves. Which had to come first: native education until desirable changes came about naturally, or a leadership which could plough back increased standards of education and living from controlled or directed development? How far are we justified in failing to apply modern scientific developments in pest control, new improved varieties of agricultural crops, newer medical discoveries, even where the native peoples do not realise their need? I note perhaps some extreme cases; in practice it is a question of the proper approach and trusted leadership rather than autocratic direction.

It may be that, at the present time when the right of peoples to self-government is so much discussed, the question may well be asked as to whether scientific studies should be pursued in the same way as in the past, in parts of the world where nature and custom do not inevitably impel the rational recognition and application of facts established by the pure and applied sciences.

In these days, unfortunately perhaps for those who wish to pursue their scientific enquiries in peaceful isolation, science and government cannot be kept entirely separate. Only modern science can answer the demand for a higher level of national well-being and of freedom from want, that new basic governmental principle in every country where living standards are subnormal. Only modern research seems able to help eradicate the poverty and privation among large groups of the population in many countries, a poverty and privation which would seem fundamentally unnecessary in the twentieth century.

Moreover it is only through education and the free exchange of scientific information that countries may so understand each other that they can work together.

There should thus be developed a more ready and speedy exchange of information on such matters as education, public hygiene, nutrition, tropical agricultural methods and industrial development so as to promote the more rapid spread of effective welfare policies.

I think it is too late to argue that we should now leave these people to develop themselves. The impact of our Western civilisation on the native peoples of the Pacific has in many cases had sad consequences to their health, happiness and well-being. We have introduced man's worst diseases, we have unwillingly perhaps introduced serious pests. Our means of transportation have already as in Hawaii and Fiji introduced alien people who tend to overwhelm the native population. During the last half-century we have come to realise some of the ills done to these people in our name. We have now evolved scientific methods and outlook which will, I hope, enable us to proceed more wisely and rectify some of our previous mistakes. It is the age-old question "Am I my brother's keeper?". In any case, if the ideas behind U.N.O. are to survive, the modern world must move towards a democracy among peoples and nations; the recognition of the rights of smaller groups of peoples, and a raising of the standards of living of the more backward countries. The natural sciences are essential to the cultural and

material development of all such countries. But the raising of living standards will be accompanied by increased survival, and more and more food will be required, so that improved scientific methods of agriculture will be necessary and we can no longer rely on primitive traditional methods of food production.

SCIENCE IN COUNTRIES BORDERING THE PACIFIC.

Before discussing co-ordination of Pacific Research it may be well to note briefly some aspects of the state of science in a few of the countries bordering the Pacific.

Antarctic.—Apart from the most admirable work of the Discovery Committee in marine biology (and the recent United Kingdom expedition to Queen Maud Land), most of the recent effort of exploration and investigation has been carried out by the various Byrd expeditions. Australia has this year again entered this field with a station established at the McQuarries, New Zealand at the Auckland and Campbell Islands.

Chile.—There is a thriving Chilean Academy of Natural Sciences at Santiago. The library of the University of Chile has some 200,000 volumes. The publication "Biologica" (mainly in Spanish) of the Imperial University at Santiago appears regularly and contains good scientific papers, mostly of local interest. An important Chemical Congress is to be held this year, attended *inter alia* by two delegates from the United Kingdom. New Zealand sent entomologists to Chile several years ago in search for useful parasites, and received every assistance.

Peru has shown considerable scientific advance since the 1914 war. There is an active Peruvian Academy. A Geological Society was founded in 1924 and a Chemical Society in 1933, and an important observatory (financed originally from D.T.M.) at Huancayo. Several Peruvian workers have secured international rank as scientists.

Colombia also has its Academy founded in 1930.

Mexico is advancing rapidly in scientific status. The Mexico City National College was founded in 1930, and UNESCO held its meeting there last year.

United States is by far the leading country in the promotion and carrying out of research in all areas of the Pacific, particularly in ethnology, anthropology, oceanography, geology, etc.

A Committee on Pacific Exploration was set up by the United States Academy of Science during the first world war, and at the close of the war this was transferred to the National Research Council. This committee organised the first Pacific Science Congress in Honolulu in 1920. Since then, five more of these international meetings have been held in Australia, Japan, Netherlands East Indies, Canada and the United States. The seventh meeting is to be held in New Zealand in February, 1949. In the meantime the Pacific Science Board replaced the committee referred to in December, 1946. This board has been established to aid the scientists of America, who wish to engage in scientific investigations for which there is a need in the Pacific area; to advise governmental and other agencies on scientific matters pertaining to the Pacific, and to further international co-operation in the field of Pacific science. The Pacific science office of the board is at 2101 Constitution

Avenue, Washington, 25, D.C., with the Honolulu Branch Office at the Bishop Museum.

The board has established several long-range projects, such as "The Survey of the Fish Life of the Pacific". During 1947 the board has been engaged, co-operatively with administrations concerned, in two scientific research operations:

- (1) Co-ordinated Investigation of Micronesian Anthropology (C.I.M.A.) and
- (2) Insect Control Committee for Micronesia (I.C.C.M.).

The board and these latter committees have already sponsored much active and useful work; its area covers "the ocean and the land beneath it as well as the layers of air above". It includes the Pacific Islands from the Aleutians in the north to Australia in the south. China, Japan and India are not included, however.

In addition, it is anticipated that the Fulbright Funds will be of great assistance, the following equivalent amounts in millions of dollars being probably available in the Pacific area in the currency of the countries concerned:

Australia 5.0; Netherlands East Indies 7.0; New Zealand 2.3; Siam 4.0; Burma 3.0; Philippines 2.0; China 20.0.

Under the terms of the Fulbright Bill these funds are generally available for (a) financing studies and research for American citizens in universities, etc., in such foreign countries—(b) furnishing transportation for citizens of such foreign countries to attend American schools and institutions of higher learning.

Canada.—There is little needs to be added to the information given in the excellent recent address by Dr. J. Malloch before the Society. Canada is becoming increasingly interested and active in researches in the N. E. Pacific, and is, for instance, sending a large contingent to the Pacific Science Conference to be held next year.

Russia and Japan.—Proceeding round the Pacific we come to Russia and Japan, but of their activities one can only make conjecture except to say that they showed considerable activity before the war, *e.g.*, in marine biology, and it is likely that this interest will increase.

China.—The same may be said of China.

Netherlands Indies (population over 60,000,000).—The Netherlands East Indies have a long and fruitful record of scientific investigation in areas bordering their territory. These have recently been well and fully summarised in all subjects in a book published in the United States under the joint auspices of the Institute of Pacific relations and the general editorship of P. Honig.

The influence of the famous Treub Laboratory (botany, etc.), established at Burtenzorg 75 years ago, has been far reaching, apart from that of the large number of experimental stations established and usually devoted to a single crop, such as sugar, indigo, coffee, tea, rubber, chinchona, palm oil, roselle, fibre, etc. In addition, there are other organisations called "centres" which collaborate in furthering the cultivation and standardisation of kapok, essential oils, tapioca and gums and resins.

The commercial effect of this scientific effort may perhaps best be indicated by

the 1939 figures of percentage of world exports contributed by Netherlands East Indies, *e.g.*, quinine 90 per cent., kapok 64 per cent., rubber 33 per cent., palm oil 46 per cent., sisal 25 per cent., tea 17 per cent., etc.

In passing, and to save repetition later, the following quotation from an article by P. Honig himself in the book referred to and under the heading of "Agriculture in the N.I.", appears to be worthy of introduction, particularly in its reference to the importance of free exchange of research information.

"Until 1932 the distinctive feature of the experiment stations in the Netherlands Indies was an absolutely free exchange of experiences and an unlimited right on the part of the research workers to publish their experiences and to compare their views with those of their colleagues anywhere else in the world. The conviction, that the system of free trade, of which the Netherlands Indies has been a keen advocate, was the best for the country, brought with it the obligation to see that the liberty to exchange goods was accompanied by the liberty to exchange experiences and views.

"The free exchange of experience is a complement to the free exchange of goods. In this way the supply of goods will be secured most efficiently in definitely designated production areas. This reciprocity can be developed or maintained only when production methods are made known and when it is recognised that the natural right of every country and every production region is to develop the crops that it can operate better than other production centres.

"The year 1932 brought a marked change in this conception. At that time the world turned selfishly despotic in all respects. Domestic products were protected by tariff walls and import quotas. Every country tried to protect its own production with all the means at its disposal, including restrictions on the exchange of experience.

"It is not necessary here to enlarge on the recent past. The development of our agricultural enterprise was a result of freedom. It is inevitable that the tendency towards secrecy becomes a two-edged sword which turns against national production. It leads to secrecy within a small circle and to the neglect of possible development. This condition leads to a working situation in which orders come from a central point and travel along organised ways. Collaborators are deprived of the pleasure which grows from understanding and sharing what happens, from the knowledge of the how and why of proposed changes, and from the recognition of results and their application in the practice of the organisation.

"If there is something to be learned from Netherlands Indies agriculture, it is the understanding that development is closely connected with a free exchange of experience and the recognition that great value accrues from every collaborator being given an opportunity to announce his views, to have these tested by experiments, and to speak of his own experiences at meetings and in trade literature. This condition of co-operation permits all to collaborate and to understand proposed projects. It fully recognises the enormous value of workers who are earnestly and energetically pursuing science. They show by their own example that the collaboration of all concerned is an essential condition of progress. With this co-operation between the specialist and the nation real progress is possible. Together they are enthusiastic for the new things

that can be created; together they are enthusiastically convinced that every personal work is of value to the work of the entire community.

"If in our time, when there is so much talk about the ideals of freedom, a lesson can be learned from the past, it is that Netherlands Indies agriculture shows how collaboration in freedom—practically unhampered by contractual regulations to one's own company, to the chief or other superior, or by other ties, but borne on the highest priority when determining one's actions—leads to pre-eminent achievements. It shows one way to raise our world to a higher plane, one way to realise the ideal of freedom from want: supply efficiently the available goods to all who are in real need of the necessities of life."

Malaya.—Proceeding southwards from Netherlands East Indies and omitting the Philippines we come to Malaya, and while so far there has been little research centred on Singapore, for example, the new plans for the development of Raffles College may well allow for this. The Japanese kindly built an extra wing to the College, although they intended it for other purposes.

Fiji has, in the past, been served by good agricultural officers of the colonial service, whose relations with colleagues in New Zealand and Australia have been mutually helpful, and several aspects of agricultural research have been fostered, including entomology, plant breeding, and, to a lesser extent, problems of soils and of the sugar industry.

Australia.—This is hardly the place to describe the excellent C.S.I.R. organisation. There has, during the past ten years, been a considerable awakening of interest in the research problems of North-East Australia (*e.g.*, the Barrier Reef), and the Mandated Territories, particularly New Guinea, including ethnology, anthropology, fisheries and natural resources.

New Zealand.—Apart from the work of the D.S.I.R., whose operations have extended to studies of Pacific geology and soils, one may mention the Geophysical Observatory maintained at Apia, Samoa, and the ionosphere stations maintained at Rarotonga, Cook Islands and elsewhere. The Polynesian Society has contributed in such fields as ethnology.

CO-ORDINATION OF RESEARCH

The individual scientific workers in any country are almost invariably most co-operative and helpful to scientific workers in other countries, but are, in general, somewhat afraid of the word co-ordination, if and when it involves the distribution of projects and information from a central point and along over-organised channels. Between Australian and New Zealand scientists, for example, there are the most cordial and helpful relations, whether the scientists concerned are in Government service, in universities, or are members of private societies or institutes. The scientists can not only freely communicate with each other, but can get together at the annual gatherings of the N.Z.A.A.S., for example, or at the growing number of specialist scientific conferences.

Such co-operation or co-ordination is fostered by the Governments concerned, who also freely agree to the loan of specialist scientific officers from one country

to the other. The same spirit is shown throughout the Pacific in spite of the large distances between countries concerned. In addition, there have grown up at least three special international organisations to foster more organised liaison on the scientific problems of the Pacific.

Firstly, there is the Pacific Science Board, to which reference has already been made. Secondly, there is the Institute of Pacific Relations, founded in 1925, to facilitate the scientific study of the *Peoples* of the Pacific area and which is an unofficial and non-political organisation. It is composed of autonomous National Councils in the principal countries of the Pacific. Apart from conferences held at three-year intervals, the last one at Hot Springs in 1945, it conducts an extensive programme on the political, economic and social problems of the Pacific area. It also publishes the proceedings of the conferences, a quarterly journal "Pacific Affairs", and many scholarly books and popular pamphlets embodying the results of its studies.

Thirdly, we have the Pacific Science Conference which meets every five years, and, as already mentioned, is to meet in New Zealand in February, 1949, under the auspices of the Royal Society of New Zealand and sponsored by the Government. These congresses constitute an important forum for organised contributions on factual research aspects of all sciences in the Pacific.

It is perhaps also worthy of mention that in the fields particularly of ethnology and anthropology, the Bishop Museum at Honolulu has for many years functioned not only as a research unit but as a co-ordinating centre for Pacific studies, including the various museums in countries bordering the South Pacific and societies such as the Polynesian Society of New Zealand. Many other similar organisations and institutions may perhaps be mentioned, including the important work of the International Health Division of the Rockefeller Foundation.

GOVERNMENTAL SPONSORED CO-ORDINATION

The idea of organised regional co-operation in research and development in colonial territories has arisen simultaneously in many regions of the world during the past few years. We have the several schemes in Africa, the Caribbean Commission and now the South Pacific Commission. All may be said to be still in the formative stage and it is earnestly to be hoped that these experiments in international co-operation will be successful. It is highly important that such schemes should start off and develop in an atmosphere of administration carefully considered, and in this connection the quotation given above from P. Honig is worthy of consideration. To obtain best results the central motivation should be the scientific problems and facts involved and full, direct and free exchange of scientific information should be encouraged. The motivation should not be predominantly that of exploration, or the so-called "correct" regulation, or exchange of goods.

The developments should, I suggest, be carefully and liberally fostered and allowed to grow as an organism in a regional ecology rather than be placed in the strait-jackets of a premeditated political organisation. These principles are traditionally more readily understood in the natural sciences, but in the social sciences, rapidly being placed on a more objective scientific basis, they are less easy of acceptance by administrators of the old school.

The relation of regional research councils to individual area administrations will need continual careful thought. Moreover, the former will probably serve best by tackling common fundamental problems rather than controlling the initiative of workers in individual countries. It is necessary also, so to co-operate with district administrative officers (agricultural advisers, etc.), as to encourage the research outlook in all concerned, so necessary in a dynamically changing world.

Such a regional commission is that recently inaugurated in the South Pacific, which arose initially from discussions between the Australian and New Zealand Governments at Canberra in January, 1944. The two Governments took the initiative by pledging themselves to promote a regional commission at the earliest possible date. The logical outcome of this resolve was the convening of a conference at Canberra in January, 1947, to which representatives of France, United Kingdom, United States and the Netherlands were invited. The agreement to establish a South Pacific Commission which this conference framed was far-reaching in design, and laid the foundations for the possibilities of co-operation by six nations, all of whom were faced with many similar problems in their widely scattered dependencies in the Pacific. The basis of financial contribution is Australia 30 per cent., France and U.S.A. each 12½ per cent., Netherlands, New Zealand and the United Kingdom each 15 per cent.

The Agreement which comes into force upon ratification will establish a Commission of twelve persons charged with promoting the economic and social welfare of the people of dependent territories in the South Pacific, while not entertaining questions of politics or defence. The commission is to be served by two permanent auxiliary bodies—a Research Council, whose duty will be to co-ordinate the research activities of all bodies working within the scope of the commission, and a body representative of the inhabitants. The territory covered is south of the Equator and east from and including Netherlands Indies.

The establishment of the commission, which is modelled fairly closely along the lines of the Caribbean Commission, will mark another important step towards the fulfilment of the Declaration regarding non-self-governing territories contained in Article 73 of the Charter of the United Nations, whereby nations responsible for the administration of territories which have not yet attained a full measure of self-government accept as a trust the duty to promote to the utmost the well-being of the inhabitants of such territories.

By accepting the obligations of Article 73 in regard to the Cook Islands and the Tokelaus, and by concluding a trusteeship agreement in respect of the former Mandated Territory of Western Samoa, New Zealand has assumed some measure of international accountability for all the island dependencies which are administered by her.

The practice of collaborating in matters of regional concern has been somewhat hindered by the great complexity of political administrations in the Pacific, the wide dispersal of island dependencies and a tendency towards insularity on the part of the Governments concerned. It is true that the territories administered by the various member Governments of the commission contain people of very different races, yet of recent years there has been a growing realisation that many island

problems must be the subject of concerted and collaborative efforts on a regional basis.

The common suite of maladies, most of them easily communicable, such as yaws, dysentery, filiaris and hookworm, illustrate the truly regional character of at least one problem—disease. A regional body on which all the administrations concerned are represented, an arrangement for the pooling of scientific resources, the interchange of information and the sharing of expensive facilities could achieve more progress than a single administration, forced to rely on limited financial resources and hampered by lack of facilities and shortage of research workers.

The South Pacific Commission marks the logical culmination of the movement towards regional co-operation. Existing regional services, such as the South Pacific Health Service and the Central Medical School in Suva, which trains native medical practitioners to serve in Fiji, Samoa, the Cook Islands and the W.P.H.C. territories, have usually been limited in their composition to member States of the British Commonwealth. The commission, however, will be representative of all the administering Powers in the Pacific, and one of its principal objects will be to broaden the basis of existing regional schemes, and by means of increased participation to secure a measure of uniformity and a degree of co-operation never before possible.

Although the commission is to have no organic connection with the United Nations, provision for consultation and co-operation with the United Nations and its Specialised Agencies on matters of mutual concern has been written into the Agreement.

To the research council of the South Pacific Commission will fall the responsibility of promoting and directing research studies covering a wide range of problems in the several fields of health, economic development and social reform. The research council is intended to be composed of a small number of distinguished scientists presided over by a deputy chairman responsible for supervising the execution of the programme of the research council.

The functions of the research council are stated to be:

(a) To maintain a continuous survey of research needs in the territories within the scope of the commission and to make recommendations to the commission on research to be undertaken;

(b) To arrange, with the assistance of the Secretary-General, for the carrying-out of the research studies approved by the commission, using existing institutions where appropriate and feasible;

(c) To co-ordinate the research activities of other bodies working within the field of the commission's activities and, where possible, to avail itself of the assistance of such bodies;

(d) To appoint technical standing research committees to consider problems in particular fields of research;

(e) To appoint, with the approval of the commission, *ad hoc*, research committees to deal with special problems;

(f) To make to each session of the commission a report of its activities.

It will be apparent that the principal duty of the research council will be to act as a co-ordinating and supervisory agent in all matters of mutual scientific concern.

The initiation of research projects, the dissemination of information, the allocation and posting of workers, questions of overlapping in research studies, and a determination of research priorities, will all fall within the competence of the council, as well presumably as expert advice to local administrations.

The independent status of the research council should free it from many of the disabilities which must necessarily attach to research bodies which are responsible to a particular administration. It should be possible for the council to undertake many neglected but highly significant enquiries, including linguistic and ethnographic studies which have hitherto been neglected officially.

The South Pacific Commission may be said to mark one of the most significant advances in international collaboration between nations responsible for the administration of dependent territories. It may be said to be a recognition that the paramount consideration of all administering authorities should be the social and economic welfare of the native people themselves, and it is intended as a genuine endeavour to give effect to the principles of enlightened colonial policy so strikingly outlined in the Charter of the United Nations.

DISCUSSION

MR. S. H. CLARKE: Dr. Marsden has suggested that a better type of human being would result from breeding from the best of the Polynesians than from the worst of us. He has during his lecture repeatedly referred to the possibilities of "training" the Polynesians; I should like to know whether there are any indications of their response to education as distinct from training. How would a Polynesian develop in an English school or an English university—would they automatically follow our ways of thought; or do they appear to be fundamentally (*i.e.*, inherently) different?

DR. E. MARSDEN: My reference to selected breeding was based on a figure I saw in a pamphlet a few days ago that there appeared to be evidence that the I.Q. of children was decreasing about two points per generation, due to smaller families among the more intelligent section of our population. I appreciate it is difficult to obtain accurate assessment in such matters. Your whole question is a difficult one and I can only base my answer on my own experience.

The best orators in the Houses of Parliament in New Zealand have always, during the past fifty years, been Maoris, who have the most beautiful flow of language. In the direction of oratory, Polynesians as a race are good.

Maoris have been able to hold their own at our universities, particularly in arts subjects. There have been some good Maori doctors and lawyers. Recently Maoris have obtained good university degrees and done research in certain scientific subjects, such as botany and geology. There must be a large influence from their home conditions, and it is not improbable that if Maoris were brought up in an engineering or scientific environment, they would develop as well as Europeans.

We have Samoans at our observatory. They perform arithmetical and algebraic work quite well. We have also used Cook Islanders on ionosphere stations and they prove capable of understanding electrical circuits. The general knowledge of Polynesians, and Maoris in particular, of plant breeding and soils in relation to their main crops is of a particularly high standard, even though not expressed in modern scientific terms. They knew the principles of selection and breeding of phormium tenax, for example, and they must have had some acquired knowledge of mineral deficiencies. Polynesians are particularly capable in music.

Seeing them in their homes and not in a scientific atmosphere one would have thought they would be relatively better in arts than science. I am not really qualified to judge.

I was once in Apia (Samoa) on the occasion of the visit from the American Governor of Tutuila. At only a few minutes' warning he visited the local school at Ifi-Ifi. The children, without rehearsal, and at sight, sang the Star-Spangled Banner from four-part tonic sol-fa hurriedly chalked up on the blackboard by the teacher. Similarly the Polynesians can sing using half tones for better harmony. They are a friendly, lovable people—they can be led but not driven.

Sir HARRY LINDSAY: I have just one question to ask, but it starts off with a statement. The Empire Lectures Scheme of the Imperial Institute includes a Maori, Sergeant Paiki, as one of its most successful lecturers on New Zealand. He may be known to Dr. Marsden; anyway he is outstandingly successful as a lecturer, especially to school-children and his method of getting his New Zealand stories across has the outstanding merit of directness and simplicity. That is the statement.

The question is this: I presume that your four universities are open to the education of Maoris and Europeans alike? You make no distinction, I suppose, in your school classes and your universities are open to both?

Dr. E. MARSDEN: Yes, all people who go through the secondary schools and get their School Certificate have the right to go. There is no class distinction. I suppose one looks on the Maoris as being a little lazy as a group, but that is because they are sensible and we are silly! There is no bar in any school against any Maori. No teacher would be worried by having a few Maoris in his class, nor would the rest of the class worry.

THE CHAIRMAN: I think perhaps I should draw the proceedings to a close. I should like to thank Dr. Marsden very much on your behalf. I regard singing "The Star-Spangled Banner" at sight as a far better test of intelligence than eloquence in the House of Commons! I think it is miraculous to sing at sight a thing that you have never seen before.

I was very much impressed by the humbleness of science in Dr. Marsden's hands. I am sometimes appalled by its arrogance; but the way Dr. Marsden approached it was, I thought, very encouraging for the success of the future work that the scientists have in hand in that part of the world. The giving of due account to human factors such as land tenure, and to the fact that one often goes wrong in science—that is the only possible way of approaching such an elaborate question as Dr. Marsden is dealing with in the Pacific. I think we have all learned a great deal from the lecture. I have learned an enormous number of things that I did not know. I imagine that we all have. I was particularly happy, in view of my office, to hear of the good relations between Australia, New Zealand and Great Britain, especially in the exchange of scientific information. It is much easier to exchange scientific information if one knows that it is going to be mutual. One is never quite sure of that these days outside certain types of country. Within our own Commonwealth and the western democratic world everything that leads to a greater increase of knowledge is to our mutual benefit and I was very glad indeed to hear that that part of our co-operation is going very well. Those are the two points which struck me particularly. I should like to thank Dr. Marsden very much for his lecture on behalf of the audience.

The vote of thanks was carried with acclamation.

Sir HARRY LINDSAY: I do not think we should like to leave without passing a hearty vote of thanks to our Chairman for finding the time in his busy life at the Commonwealth Relations Office to preside over our meeting this afternoon.

The vote of thanks was carried with acclamation, and the meeting then terminated.

THE WORK OF THE ROYAL DESIGNERS FOR INDUSTRY

Reprint of a lecture given by GORDON RUSSELL, C.B.E., M.C., R.D.I., F.S.I.A., to the Design and Industries Association, at Burlington House on October 6th, 1948.

The Faculty of Royal Designers for Industry is only twelve years old. At this tender age it is about to hold an exhibition of its members' work at the Royal Academy, sponsored by the Royal Society of Arts and the Council of Industrial Design.

To me there is something singularly appropriate in the collaboration of these four bodies which has made the exhibition possible, and I think it is the happiest augury for the future of Industrial Design in England. In the first place, it was as a result of an exhibition at Burlington House in 1935, in which the Royal Academy was closely associated with the Royal Society of Arts, that Mr. J. A. Milne put forward the suggestion that the ancient and learned society, of which he has been such an active member, should set up an exclusive panel of not more than forty industrial designers eminent in their profession. Now the Royal Society of Arts, or, to give it its full title, the Royal Society for the Encouragement of Arts, Manufactures and Commerce, is the oldest body in England which has been interested in industrial design problems from its inception in 1754.

During the active presidency of the Prince Consort, the Society was responsible for initiating the Great Exhibition of 1851 in Hyde Park. The Crystal Palace in which the exhibition was housed was, in itself, one of the most remarkable examples of nineteenth-century industrial design. Its whole history was fascinating. Designed by Joseph Paxton, a most ingenious gardener, after another monumental effort had been accepted, it was seen to be in every way much more appropriate and less costly. It was made of standard parts of cast iron and glass in a remarkably short space of time and showed the possibilities of pre-fabrication. Curiously enough, the building was much better than most of the exhibits which the Prince Consort hoped would illustrate a happy marriage between art and industry.

Three years before this exhibition was held, in 1848—a year of revolutions—the Royal Society of Arts had the courage to stage a curtain-raiser; a small exhibition to make manufacturers aware of what was coming in 1851. I am sure you will agree that it is most appropriate that under the Presidency of the Prince Consort's great-great-grand-daughter, the Princess Elizabeth, a similar gesture should be made. 1948 is not yet a year of revolutions, but it is certainly one of great political unrest and only three years from a most exhausting war. Again we shall need to stick to our guns and not be flustered by bogeymongers.

The other body concerned in this exhibition by invitation of the Royal Society of Arts is the Council of Industrial Design and it is the youngest of all, not yet four years old. But in "Britain can make it" in London and "Enterprise Scotland" in Edinburgh and various travelling exhibitions it has already shown a considerable knowledge of exhibition technique. The Council of Industrial Design is a proof that the Government now takes industrial design seriously. It is indeed a matter of great importance that the design of British catalogues, packaging and goods should be as high in standard as the workmanship and material.

I am proud to say that I am closely linked with three of these bodies—as an

ex-officio member of the Council of the Royal Society of Arts, Master of the Faculty of the Royal Designers for Industry and Director of the Council of Industrial Design.

In setting up the Faculty of the Royal Designers for Industry in 1936, the Royal Society of Arts wished to enhance the prestige of the whole profession of industrial design in this country. They did not wish to set up an exclusive body in the narrow sense. We accept that responsibility very fully. Although this exhibition is pioneered by the Royal Designers for Industry, it tells a story which is common to all designers. I wish to make it very clear that there are numbers of most competent designers who, owing to the limitation to forty—to my mind a necessary limitation—cannot call themselves Royal Designers for Industry. These letters should connote a standard, but most certainly not a feeling of superiority or complacency. We are not a professional body. It is obvious that in a group with a total membership of forty covering industrial design as a whole no one industry could be adequately represented. It was never intended that it should be. We are indeed on the very friendliest terms with the Society of Industrial Artists, of which many of us are members and which is the recognised body in the industrial design profession, with special groups for textiles, commercial art and so on. Its president, Milner Gray, who has done so much to nurse this young society through the usual teething troubles, is himself an R.D.I. and is responsible for planning our exhibition.

I hope I have made reasonably clear to you this somewhat involved but, to me, extremely interesting background picture.

What then is the work of the Royal Designers for Industry? In the first place I would say that the Faculty, as a body, does not, of course, design or accept commissions of any sort. But many of its members have worked together at one time or another on problems which were sometimes closely linked and sometimes much more loosely connected. An example of the former is the Design Panel for Utility Furniture at the Board of Trade. Of this I was Chairman from its setting-up in 1943 until last year, when Frank Austin took over. Among the Royal Designers for Industry who worked on it at various times were Enid Marx, R. Y. Goodden and my brother, R. D. Russell. An example of the second kind is in the widely dispersed activities of London Transport. Here no fewer than ten Royal Designers for Industry have worked at one time or another. The list is an interesting one: Christian Barman (publicity, lettering), Eric Gill (sculpture), Milner Gray (posters), Charles Holden (architecture), McKnight Kauffer (posters), Enid Marx (moquettes), Harold Stabler (tiles and posters), Fred Taylor (posters), Anna Zinkeisen (posters) and myself. Then there is the comparison between designing for hand and machine technique in a similar material as shown by Edward Hald's work for Orrefors (Sweden) or the late James Hogan's designs for table glass for Powells and the table glass by R. Y. Goodden for Chance's. The first shows admirably the brilliance and bubble-like quality of hand-made glass and the latter is based on most careful study of the slightly misty surface which is one of the results of pressing glass in a mould and the necessity of allowing for the "flash" caused by joints in the mould.

Then too it should be noted how the last designer, R. Y. Goodden, has tackled a wide variety of design problems: glass, silver—he designed the gold box presented by the Royal Society of Arts to the Princess Elizabeth and the Sword of Honour

presented by the City of London to Lord Alanbrooke, both of which will be shown in the Exhibition—also furniture, marquetry and exhibition stands—whereas the extreme complexity of designing aircraft or ships means that Sir Geoffrey de Havilland, B. N. Wallis and Charles Nicholson very naturally have little time for other subjects.

Again some R.D.I.s themselves practise a craft and also design for the machine. The late Eric Gill was an outstanding figure in this class. A letter-cutter of genius, a well-known sculptor, an expert wood-engraver and designer of several founts of type of great beauty for the Monotype Corporation, one of which, his "Perpetua", is used for the exhibition book. As one who believes that hand and machine work are complementary, even if only in the narrow sense that some things are wanted singly and others in quantities, I think this combination is most important. A world dominated entirely by the machine must of necessity be a far poorer world than one which also has the stimulation, experimentation and inventiveness which only the closest association between designer and craftsman merged in one person can give. It was because of Gill's immense knowledge of the individual letter by actually drawing and cutting it for years at far more than type size that he became such an efficient and sensitive type designer. As Sir Francis Meynell has pointed out, printing is unique among crafts in that whilst all printing jobs are purpose made, it has been itself a mass production job from the beginning. Perhaps it is because of this longer experience that its standard is so much higher than that of many other trades. In book designing and typography, too, the names of Sir Francis Meynell, founder of the Nonesuch Press, J. H. Mason and Percy Delf Smith are widely known. There is Sir Ambrose Heal, whose pioneering work on furniture design has steadily raised the standard and R. D. Russell and Wells Coates, who have both had a very great influence on the radio trade over nearly twenty years, using both wood and plastics.

The fact that there has been no recognised training for industrial designers is shown by the number of architects who have turned their hands to this work. Charles Holden, architect of the new London University, of hospitals and of London Transport stations, has also designed furniture and industrial equipment. Keith Murray, whose admirable glass for Stevens and Williams and pottery for Wedgwoods gave him the necessary knowledge of production method to collaborate in designing the new Wedgwood factory at Barlaston, one of the most seemly and up-to-date pottery factories in the world. Brian O'Rorke, who has been appointed architect for the new National Theatre, has done excellent ship-fitting for the Orient Line. Christian Barman has built several houses, designed several years ago, the first real breakaway electric iron, bus shelters and lettering. Wells Coates has designed new types of housing and extensions to the Ekco factory. He also designed their radio cabinets; even catamaran sailing boats are among the wide range of other things to which he has turned his attention. R. D. Russell and Allan Walton built several houses. Robert Goodden has already been mentioned. The work of Alvar Aalto, Walter Gropius and Steen Eiler Rasmussen is internationally known. All of these are architects.

Then, in Allan Walton also, a member of another group appears. Not only did he design textiles which have had a great effect but he set up his own company to

produce them and then gave great encouragement to other designers as well. Milner Gray, of Design Research Unit, comes into this category. A competent designer himself—his work during the war for the Ministry of Information greatly raised the standard of exhibitions—he has gathered together a group of designers who have specialised in packaging, exhibition stands and similar problems. Sir Ambrose Heal has not only designed much furniture but has made Heal & Son a centre of pilgrimage for all who care about well-designed things. The same applies to Susie Cooper, whose pottery is well known.

There is a group of Royal Designers for Industry who work by hand for translation into machine processes: Duncan Grant, Allan Walton, Ethel Mairet in textiles—the latter specialising in first-rate hand-woven and hand-spun textiles, but also interested in making experiments for machine weaving; Percy Metcalfe, designer of coinage for Eire, New Zealand, Turkey, Greece, Iraq, Fiji, Egypt and Bulgaria and also stamps; Tom Purvis, Fred Taylor, McKnight Kauffer, Anna Zinkeisen and the late Harold Stabler in posters—Stabler also designed silver, glass, medals and enamels and was one of the best heraldic artists of his time. His knowledge of animals and trees was remarkable.

Anna Zinkeisen has also been responsible for stage decor, as have Gordon Craig and Laurence Irving. Such artists, working in a way which admits of bold experiments, can powerfully affect the shape of things to come. Raymond Loewy is in a class of his own, as he works on a truly American scale.

Several Royal Designers for Industry are design directors to well-known firms. The work of Reco Capey for Yardleys, Ashley Havinden for W. S. Crawford, or A. B. Read for Troughton and Young is known far and wide. Ashley Havinden, who has designed the Exhibition poster, has affected the outlook of his generation on posters and similar work. The Lighting Centre is Read's work over the past twenty years. The work of R.D.I.s on exhibitions has been of outstanding importance: James Gardner on "Britain Can Make It", "Enterprise Scotland" and "Design Fair" and many others, Milner Gray as mentioned with the Ministry of Information, Wells Coates, R. Y. Goodden, R. D. Russell, and, for good window display, E. W. Grieve.

Among R.D.I.s, who paint, lithograph or etch, I would mention James Gardner, Duncan Grant, Ashley Havinden, Tom Purvis, Percy Delf Smith, Allan Walton, Anna Zinkeisen and McKnight Kauffer.

Royal Designers for Industry may be found on almost all committees dealing with design problems, and their range of expert knowledge is wide and valuable. Among those who write, lecture or broadcast, I must mention Christian Barmen, Wells Coates, Gordon Craig, James Gardner, R. Y. Goodden, Milner Gray, Ashley Havinden, Sir Francis Meynell, A. B. Reed, R. D. Russell, Allan Walton, Enid Marx, Walter Gropius, Raymond Loewy, Edward Hald and Alvar Aalto.

All these designers feel that education of the public in higher standards of design is absolutely essential and that this is a job in which they must take a turn, often in spite of pressing work in other directions. I think it must be admitted that at the present time the practising designer with wide experience can impart knowledge which cannot be gained by teachers who leave one art school as a student to teach in another. I am therefore proud to be able to say that a large number of R.D.I.s

have given time to teaching because they felt it was an essential thing to do. An outstanding example was my very dear friend, Allan Walton, who died a few weeks ago. During the war he was Principal of the Glasgow School of Art and he was to have taken over the Chair of Textile Design at the Royal College of Art, under Robin Darwin, who is courageously reorganising the School. Two other R.D.I.s are teaching there, Professor R. Y. Goodden—silver—and Professor R. D. Russell—light engineering and furniture. Harold Stabler was for many years Principal of the School of Art of the Sir John Cass Institute, where he was followed by Milner Gray, who also held the appointment for several years. H. G. Murphy was for several years Principal of the Central School of Arts and Crafts. Professor Aalto is lecturing in America. Professor Walter Gropius is in the Chair of Architecture at Harvard, and Professor Rasmussen, who at one time taught at the Architectural Association and wrote one of the best books on London, is at the Academy School, Copenhagen.

At this meeting organised by the Design and Industries Association it is not inappropriate for me to mention that several of the founder-members of the D.I.A. in 1915 were later elected members of the Faculty of Royal Designers for Industry. Among these were Sir Ambrose Heal and Harold Stabler. This is very much as it should be, for it must not be forgotten that the Design and Industries Association's pioneering work helped to make Royal Designers for Industry possible.

I hope I have given you some picture of this exclusive body—the Faculty of Royal Designers for Industry—of which I have had the honour of being Master for a second year. I am the sixth Master to hold office, my predecessors being H. G. Murphy, Tom Purvis, James H. Hogan, Percy Delf Smith and Keith Murray. They are the people, who with care and skill during the exceptionally difficult war years, laid the foundations which have made it possible to start building.

I think you will agree with me when I say that one would be optimistic indeed to believe that wars lead to an improvement in manners. The exact opposite is the case. Over great areas of the world we find to-day the most elementary rules of courtesy flouted and, not unnaturally, human relationships do not survive the strain. The standard of industrial design in a country is one of the visible signs of its standard of manners and of its general approach to life. Never was it so important to hold fast to real values. Here we are determined that the Faculty shall play its part, albeit a very small one, in the great revolution we are witnessing. It is the quality of the leaven that is important, not the amount. To say that we are satisfied with our achievements would be ridiculous. We shall never be satisfied, and at the present time the frustration caused by the endless difficulties in getting designs from the drawing-board into production is very great. Even so, an occasional stocktaking is sometimes heartening, occasionally shattering, but always necessary.

Owing to the generosity of the Royal Society of Arts, we have been allowed to use the Society's House for all our meetings and for sherry parties once a month. The latter have proved very popular and have given opportunities to bring other designers as guests. We paid a visit to "Enterprise Scotland" and another to Sweden. Our greatest venture—the exhibition—is only a few weeks ahead. I would like to say how very much we appreciate the interest which The Princess Elizabeth as President of the Royal Society of Arts takes in the Faculty. Her Royal Highness paid a visit to the Society's House and presented Diplomas to three R.D.I.s last

year. Also I want to pay a very special tribute to Sir Harry Lindsay, Chairman of the Council of the Royal Society of Arts and President of the Faculty of Royal Designers for Industry. In him we have a most devoted friend and I cannot fully express the pleasure I have had from my association with him. It is certainly true that, without his help, the work we have been able to do would have been impossible. We have also been most fortunate in having Kenneth Luckhurst, the Society's Secretary, as Secretary of the Faculty. His keen interest in our work and his knowledge of the Society have been of the utmost value. I can only hope that our very young and small Faculty will be able to live up to the splendid tradition of public service which has been built up over nearly two centuries by its great foster-parent, the Royal Society of Arts. If it can do so, the influence of the Faculty of Royal Designers for Industry in improving standards of industrial design will become very great indeed and thus justify the vision of its far-seeing creators.

OBITUARY

SIR FRANK NOYCE.—It is with regret that we have to announce the death recently of Sir Frank Noyce, K.C.S.I., C.B.E., who had been a very active member of the India, Pakistan and Burma Committee of the Society for a number of years, and who had on many occasions presided at and taken part in meetings of this section.

Noyce was born near Salisbury in 1878 and went into the Indian Civil Service in 1901. In 1915-16 he was Secretary in the Revenue and Agricultural Department and later served as President of the Indian Sugar Commission. In 1922-23 he acted as Trade Commissioner for India in London and then he presided in turn over the Indian Coal Committee and the Indian Tariff Board. In 1927 he helped prepare the massive report made by the Royal Commission on Agriculture in India. Then he became Secretary in the Education, Health and Lands Department and in 1932 he was appointed to the Viceroy's Executive Council as Member for Industries and Labour.

GENERAL NOTES

THE ROYAL PHOTOGRAPHIC SOCIETY'S EXHIBITION.—The annual exhibition of the Royal Photographic Society has in recent years developed to such an extent that it has been found convenient to display the prints in two parts.

Part one includes all the pictorial prints and the lantern slides and has been open at 16, Princes Gate during September. It was reported in the *Journal* on page 691. Now follows, at the same address, part two, which includes Nature Photography, Record, Press and Commercial prints, and Scientific Photography. This exhibition is open daily till the end of October (up to 8 p.m. on weeknights).

This year, out of over 7,000 entries, 189 prints and 40 lantern slides were on view in part one, while now in part two there are 258 prints and 66 lantern slides. Not only is this the larger section but its scope and interest are very much wider. The first impression on seeing the prints is the very high technical quality of the photography. Every aid of modern science is envisaged in the processes.

Some years ago the amazing photographs taken at such small intervals as 1/100,000th second at the Massachusetts Institute of Technology enabled us to see such things as the flattening of a golf ball at the moment of impact, the digging of the toe into the rubber ball on kicking it. Nowadays modern high-speed flash apparatus is within the reach of many photographers, and good use seems to have been made of it in nature study.

Eric Hosking has three studies, obtained by flash at night, of the Owl, the Night Jar and the Wheatear in flight. The photograph is now taken before the flash has made any impression on the bird and there is, consequently, some arrested movement. The most outstanding flash photograph is that of the Robin in flight, in which the outstretched

wings are shown in all their splendour and delicacy, and one might even feel a suggestion of timidity. For this and other studies of the Tawny Owl, Ronald Thompson is awarded a Society's medal.

Included in this nature section are prints which might be regarded as portrait studies, such as the Heron, Nightingale, Corncrake, Reed Warbler, Flamingo Colony, Kingfisher, Sea Horses, and these certainly do give one an awareness of their features and probable size.

Probably the most instructive panels in this group are those which contain on the single mount as many as eight or nine individual prints, all related to one topic. They serve a useful purpose of showing in close proximity, say, a life history of types in a group. For instance, on one is shown the life history of the "clouded yellow" in all its stages, from the eggs, larvæ, pupa, emerging finally in all its glory as a butterfly. Again, the history of the Worker Honey-bee is so treated and the mechanism of control is a large reduction of temperature to produce severe chilling and so retard any movement. Another panel reveals the various inhabitants of the Hive—Queen Worker and Drone, all to the same magnification, so that there may be comparison of size.

In the Record, Press and Commercial Section there are some prints of outstanding pictorial quality—prints which, quite apart from their interest as a record, show a keen artistic treatment, and so might have come within part one of the exhibition. Among these may be mentioned the print of the "Queen Mary in Southampton Docks" in which the viewpoint and the lighting add a great dignity and sense of awe, or "Grape Fruit" a delicate study in which the juicy character of the fruit is emphasised. "Mars" would excite the wonder of many small people in seeing such a large mass of a favourite sweetmeat in course of manufacture. "J. Arthur Rank presents" reveals the doyen of the British film world with an award in his hands to present to a film star in the background, while he stands in front of a B.B.C. microphone.

Some very fine records are on view of old stained glass in church windows, carvings on pulpits, doors and altar panels, while architectural studies reveal a trend in modern design, here and abroad. J. M. Keilor of London has submitted a study of the Grundtvig Memorial Church in Copenhagen which certainly does arrest the onlooker.

This year has seen a great advance in the Scientific Section, mainly due to the interest fostered by the National Physical Laboratory at Teddington and the National Institute for Medical Research. The National Physical Laboratory exhibit reveals the comparison of different types of microscopes—the optical, phase contrast, interference and the electron. The Medical Research exhibit shows living spermatozoa of a mouse, first by ultra-violet light and then by phase contrast. There are many sections of fossil diatoms, and chromosomes are shown in cells of the bean root. There is a group of fine prints of geological studies taken from the air by Aerofilms, Ltd. and by Hunting Aerosurveys, Ltd. The "City of London" and "Cambridge" reveal fascinating points in their aerial surveys. C. T. P. Cave has two fine prints of cloud formation, Cirrus and Cumulonimbus, foreboding a thunderstorm. The Brown Firth Research Laboratories have shown micro-radiographs of steel and eutectic studies. An interesting group of radar photographs reveals how range and height presentations are used.

There is an amazing study of *Drosera*—the insectivorous Sundew—a flower which has sticky tentacles for the catching of insects. In this print a fly is entrapped and a wing is being torn off by the action of the tentacles.

John Hadland has on view two prints, in which the action of a tongue actually makes the exposure. The first is the study of a toad's tongue when feeding and the other shows the action of the tongue of the chameleon.

The Rodman Medal has been awarded to Harold F. Sherwood for micro-radiographs of thin sections of metal, wood and paper, procured by conventional X-ray processing. The interest in atomic energy has made known the properties of Alpha and Beta particles, and there are prints of these particles in an experimental photographic emulsion showing the natural disintegration of an atom of radium.

In one corner the Westminster Hospital School and Manchester Royal Infirmary

have submitted prints of various diseases, such as elephantiasis of the eyelid, carcinoma of lower lip, facial paralysis after removal of a brain tumour.

On Tuesday, 12th October, in the Science Museum, there were projected some of the 16 mm. sound and silent films entered for the exhibition. This is always a thrilling occasion, for many "tricks" of lighting and staging are for the first time brought to view.

Many of these prints are reproduced in "The Year's Photography", which is to be published shortly by the Royal Photographic Society. In this way visitors to the exhibition can have a record of the outstanding pictures.

THE ART OF GORDON CRAIG.—Mr. Edward Gordon Craig, R.D.I., has long been held in affectionate esteem by the Royal Society of Arts, which welcomes, after an interval of more than thirty years, the Leicester Galleries' latest tribute to his genius. "All his great gifts", Sir Max Beerbohm observes justly, "his power of large and luminous design, his mastery of the crafts of wood-cutting and of etching . . . have been devoutly orientated to that one great sacred beacon, the Theatre".

It is now more than half a century since Craig was a member of Irving's company, and when he made his last appearance in 1897 Ellen Terry never ceased to regret the loss of a player of brilliant parts. But by that surrender the Theatre gained an *homme du théâtre* whose influence on the stage-production of our time, in the theatres of Germany, Russia and to a lesser extent of this country, has been so widespread as to affect a revolution of European taste.

Grouped in the East Room of the Leicester Galleries are some of his inspiring designs—several of them, alas, projects which were never realised. Notable among these are a wash-drawing of a superb setting for *Electra*, intended for Duse, and an imaginative scene of Wapping Old Stairs which (though impossible to realise on any stage, as Craig admits) makes one regret more than ever that his visionary powers have not been employed in the cinema by a director of the stature of Orson Welles.

His wood-engravings, which date from the turn of the century to some twenty years ago, are wholly enchanting and ideally suitable as decorations for the printed page—as indeed some of them were, for such ventures of his as *The Mask* and *The Page* which have been brought to light in this room. In several of the prints—the cut of the artist with its simple mass of colour, for example, and the perfectly placed figure entitled "Waiting for the Marchioness"—it is interesting to observe Craig's sympathy with the methods of the Beggarstaff Brothers, but there is hardly need to remark that these products, like all his work, are signed in every line.

SOUTH AFRICAN ART.—An assembly of a hundred and fifty South African paintings, drawings and sculptures, mostly twentieth-century works, with a small historical section of earlier paintings, has been admirably arranged in three rooms of the Tate Gallery. Sponsored by the South African Association of Arts, the exhibition is the first representative display of the Union's painting ever to be shown in this country; and it is fitting that the Tate, which housed "A Century of Canadian Art" ten years ago, should hold an exhibition from another great nation of the British Commonwealth.

In the past thirty years, as the works here clearly reveal, the main influences have come from European art, and those who hope to see the growth or even the promise of an indigenous school will be disappointed. One artist—Walter Battiss, born in Cape Province in 1906—has, it is true, drawn inspiration from his native art, and several of his paintings (notably the striking patterns of "Cattle and Egrets" and "Quagga Race") bear evidence of a profitable study of the Bushman cave paintings. But it is impossible to conceive that this derivative, and in truth extremely restrictive style, could be usefully extended; and in fact the other members of the New Group in Cape Town are mostly representational painters whose work (apart from their local colour) would not be especially remarkable in any exhibition of the New English Art Club.

But if there are necessarily few revelations in a collection of works inspired, for the

most part, by the traditions of Western Europe, there are several paintings and sculptures of rare feeling and craftsmanship which should not escape the attention of the Contemporary Art Society. (Enlightened patronage is, in fact, what South African artists most urgently require. "The country has mediocre galleries and is still short of fine paintings," Mr. Geoffrey Long points out. "For a country with more than its fair share of millionaires there are too few important private collections".) J. H. Pierneef, for example, a distinguished citizen of Pretoria where he was born sixty-two years ago, deserves a wider reputation than he has acquired in the Union, though his landscapes also are seen through European eyes and worked out with Northern experience. Now, after an experimental cubist phase, he has developed into a decorative painter capable of weaving lovely patterns of rich mat colour, as his "Dar-es-Salaam" and one or two other canvases bear witness. Irma Stern, who, like Pierneef, studied in Europe, is probably as well known on the Continent as she is in her native Transvaal, on account of her series of one-man shows held during the past thirty years; and one of her five works here, "Watussi Woman in Red", with its passages of flaming colour, would enrich any gallery as a permanent acquisition.

Beside the sculptures—which include some sensitive carvings by Moses Kottler, notably a "Mother and Child", a work of perfect symmetry—there are some interesting paintings of South Africa by eighteenth- and nineteenth-century artists, which here and there possess more than documentary value.

CHISWICK HOUSE.—The news that Chiswick House has been accepted by the Ministry of Works on behalf of the nation will be universally welcome, and not least by all Fellows of the Society who are interested in the preservation of our architectural heritage. It had become increasingly evident in recent years that the eighteenth-century villa—probably the finest survival of the Palladian style in the country—was beyond the resources of the local borough council to maintain; and there is no question that, but for this action, the house would soon have been another picturesque ruin.

At present the house is fenced about and unoccupied, and presents a strangely forlorn appearance. The collection of pictures (which I remember visiting before the War) is still stored, and cannot be rehung until the process of dry-rot is arrested and the whole interior renovated. The exterior is hardly less dilapidated; cornices are crumbling, windows are boarded up, and the balustraded staircases extending from the graceful Corinthian portico require early attention.

It is rather more than two hundred years ago since Chiswick House was built by the Earl of Burlington, with the assistance of William Kent, in a formal classical style which contrasted impressively with the baroque then fashionable throughout Europe. In the lovely and spacious grounds surrounding it—a popular picnic resort for Chiswick people—there are classical statues and ornamental vases, groves and shrubberies, and a reedy stretch of water spanned by a bridge where Georgiana, Duchess of Devonshire, must sometimes have lingered in the days when the house was the property of the Cavendish family. In the last century Edward VII, while Prince of Wales, leased the house as a family residence, and it is easy to imagine that lover of gracious things strolling through the grounds to admire an Inigo Jones gateway which Richard Wilson would have loved to paint.

May this lovely relic of a bygone age soon be restored to its former beauty.

N. A. D. W.

NOTES ON BOOKS

DESIGNERS IN BRITAIN (2).

The first volume in this series, *Designers in Britain* (1), was published last spring and a review was printed in the *Journal* on page 132. A new volume is to be prepared for publication in the autumn of 1949 and will be published for the Society of Industrial Artists by Allan Wingate, Ltd. It is hoped to make the book a standard reference work of

British commercial and industrial design, and all industrial and commercial designers are invited to submit contributions to this second volume. Full details as to conditions of submission can be obtained from the Society of Industrial Artists, Room 243, Empire House, St. Martin's le Grand, E.C.1.

LONDON, THE UNIQUE CITY. By Steen Eiler Rasmussen.

A new book about London is an event to arouse a mild curiosity. A book about London by a Dane living in Denmark is an EVENT, but here we have a book on London, first published in 1934 in Danish in Denmark and subsequently re-published in 1937 in English in London with a foreword by James Bone, the author of the "London Perambulator".

A second English edition now appears and, in spite of paper shortage and post-war restrictions, there is no loss in the quality of its production and that is an EVENT for which we should be profoundly thankful.

The well-known Danish architect, Steen Eiler Rasmussen, with a discriminating passion for London, made a discovery not found in the guide books; he discovered the Spirit of London, and he set out to tell the Danes about it.

Some of his English friends, knowing the book (which they were unable to read) and knowing Rasmussen's approach to the subject (confirmed so forcibly in the numerous illustrations), persuaded him that it was even more important that Londoners should be told about their own London by Rasmussen in their own language.

With an introduction by James Bone and a publisher who entered into the adventure with zest, a great book was made available to the English public and the edition was quickly exhausted.

It is indeed a fortunate chance that it has been possible to publish this further edition, for the interest in town planning, which has been aroused by war destruction, adds force to the demand.

The author modestly, almost apologetically, presents his book to the reader with a touch of dry humour.

"The hurried man needs only look at the illustrations and read the introduction by James Bone But he should not miss the new postscript. If he has more time he can, from the index and the list of contents, easily find the items which most interest him Patient people might read the whole book"! What a challenge to the reviewer! It is a challenge also to the reader who should have little hesitation in taking up the challenge.

The reader will find a monumental book in which there are few "monuments" and yet Rasmussen's "London" has breadth and scale and atmosphere and intimacy which lift it out of the world of superficial splendours and dubious loyalties.

The book throws new light on a familiar yet little-known London. He wanders far and wide in and around London with his camera in search of material for his book, for which he has an unerring instinct. Hampstead, Islington, Blackheath, Pimlico, Mayfair, all yield up precious evidence in support of his thesis.

London, "the Scattered City", is sharply contrasted with the concentrated cities of Europe.

"The Roman walls [of London] formed a narrow barrier round the town. One usually imagines the cities of the Middle Ages as very crowded and narrow. This was by no means always the case. The fortifications were frequently advanced so far outwards that space was left inside them for gardens and open fields, a fact of importance during a siege. London *was*, however, closely packed. Comparing it with Paris and Cologne one can see how small the area was. And yet the walls were never moved Other towns have developed by adding ring to ring around the original nucleus And so, paradoxical as it appears, just because London's boundaries were so narrow, the town developed early by means of new settlements outside the walls and became a *scattered*

city, while for instance, Cologne, which had so much space within its walls that they were not moved until 1882, gradually became so congested that it became the type of concentrated city”.

Let it not be thought that the book deals only with the broad planning issue; that simply provides the skeleton framework upon which his thesis is developed. The author carries his story with admirable clarity through the ages to the present day, finding virtue in the full and free expression of the life of the people in their “one family” homes, their games, their pleasure in the open air, and fearing only that “London, the capital of English civilisation, has caught the infection of Continental experiments”, and on this note of warning he brings his book to “the bitter END”.

The lay-out of the pages is a delight from cover to cover; the chapter headings have the first line a complete sentence in capitals like the text of a sermon and the illustrations are always carefully masked and well composed and placed at the head of the pages. There is a craftsman's care and thought in all that goes to the make-up of the book—even the characteristic monogram puts the seal of the craftsman to the work.

CHARLES HOLDEN.

ON HUMAN FINERY. By Quentin Bell. The Hogarth Press, 1947. 12s. 6d.

It is a strange anomaly that costume should be proving a subject of such absorbing interest just at the moment when our dress potentialities are so drastically curtailed by rationing. In November of last year, for example, the National Book League staged its excellent exhibition of the Literature of Fashion; only the other day that wide-ranging series, *Britain in Pictures*, included among its latest issues a delightful *English Fashion* by Mrs. Alison Settle; and meanwhile there has also appeared Mr. Quentin Bell's extremely interesting essay, *On Human Finery*, which adds yet another brief volume—pleasantly though not exhaustively illustrated—to the wide existing literature on the subject.

The book is definitely an essay rather than a detailed study, and is based mainly on a work not so widely known in this country as those of such acknowledged authorities as Mr. James Laver, Professor Flugel, or Dr. Willett Cunningham: Thorstein Veblen's *The Theory of the Leisure Class*. This book Mr. Bell sets up as his maypole (as Maurice Hewlett once put it in his delightful essay on the essay), and about it he treads his measure, evolving some original dance-steps of his own. Veblen formulated certain theories of social behaviour which all directly provide the motive-power for dress and change of fashion: he called them the Laws of Conspicuous Consumption, Conspicuous Leisure, and Conspicuous Waste. Each leads by a natural corollary to another Law, that of Vicarious Consumption: the display of material wealth not on one's own person merely, but on those of elaborately bedecked hangers-on, wives, children, and so forth. To these Laws Mr. Bell adds a fifth of his own: the Law of Conspicuous Outrage, the desire to shock. It is easy to pin down varying fashions or costume periods under one or other of these Laws, to note the Conspicuous Waste of the court dress of pre-revolutionary France, the Conspicuous Leisure implied by modern sporting clothes or modern feminine evening dress, the Vicarious Consumption of the prosperous Victorian business man with his expensively draped and crinoline-embattled wife, or the Conspicuous Outrage of the shingled and kilt-skirted Bright Young Things of the post-war 1920s. All this Mr. Bell does most wittily and provocatively, though here and there the facts of costume history have been just a little too nicely trimmed to fit his theories. His final conclusions are that fashion as a cultural factor is a European phenomenon only, and that the changes of fashion of our own day are due to the emergence of a new ruling class created by the Industrial Revolution.

It was Carlyle who said once that “the beginning of all wisdom is to look fixedly upon clothes”. It is pleasant in these over-anxious days to follow yet another signpost which directs our vision in so safe and entertaining a direction.

NORAH RICHARDSON.

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, OCTOBER 25. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. T. Graeme N. Maldane. "A Western European Power Network."

Geographical Society, Royal, S.W.7. 5 p.m. Professor Frank Debenham. "The Great Ross Barrier of the Antarctic."

TUESDAY, OCTOBER 26. Architects, Royal Institute of British, W.1. 6 p.m. L. W. Ellicott. "Recent Developments in the Precastrating and Prestressing of Concrete."

Chemical Engineers, Institute of, at the Geological Society, W.1. 5.30 p.m. R. S. Morse. "Recent Developments in High Vacuum Technology."

Hull Chemical and Engineering Society, at the Church Institute, Hull. 7.30 p.m. H. R. Galleymore. "Synthetic Detergents."

Textile Institute, at the Midland Hotel, Bradford. 7 p.m. Dr. H. J. Woods. "The Structure of Fibres."

WEDNESDAY, OCTOBER 27. East India Association, at Overseas House, Park Place, S.W.1. 2.30 p.m. General Sir Frank Messervy. "Kashmir."

Regent Advertising Club, at the Royal Society of Arts, W.C.2. 6.30 p.m. The Rt. Hon. Lord Hacking. "Tourism". Vital Export."

THURSDAY, OCTOBER 28. Chadwick Trust, at the University College, Nottingham. 4 p.m. Sir Arthur MacNalty. "Advances in Preventive Medicine during the War of 1939-1945."

Chemical Society, W.1. 7 p.m. Sir Robert Robinson. "Strychnine, Brucine and Vomeline."

FRIDAY, OCTOBER 29. Mechanical Engineers, Institution of, S.W.1. 6 p.m. W. N. C. Clinch. "High Pressure Steam-Power Plant."

Metals, Institute of, at the Grand Hotel, Sheffield. 6.30 p.m. W. H. Whympere. "Casting and Fabrication of Aluminium Alloys."

MONDAY, NOVEMBER 1. Chemical Society, at the Physical Chemistry Laboratory, Oxford. 8.15 p.m. Dr. W. F. Short. "Some New Methods for the Preparation of Amidines."

Farmers' Club, at the Royal Empire Society, W.C.2. 2.30 p.m. G. N. Gould. "The Veterinary Surgeon and the Dairy Herd."

Industrial Transport Association, at the Caxton Hall, S.W.1. 7 p.m. D. Viney. "The Railways and our Daily Life."

TUESDAY, NOVEMBER 2. Chadwick Trust, at Westminster Hospital Medical School, Horseferry Road, S.W.1. 2.30 p.m. Wyndham E. B. Lloyd. "The Prevention of Tuberculosis, with special reference to Environment."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. Professor F. C. Williams and T. Kilburn. "A Storage System for Use with Binary Digital Computing Machines."

Physics, Institute of, at the University, Glasgow. 7 p.m. Dr. F. C. Toy. "Some Applications of Physics in the Textile Industry."

WEDNESDAY, NOVEMBER 3. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. G. W. A. Dummer. "Aids to Training The Design of Radar Synthetic Devices for the R.A.F."

Metals, Institute of, at the Engineers' Club, Manchester. 6.30 p.m. Dr. N. P. Allen. "Recent Developments at the National Physical Laboratory."

THURSDAY, NOVEMBER 4. Chemical Society, at the University, Sheffield. 5.30 p.m. Professor W. T. Astbury. "The Electron Microscope and Some Recent Discoveries with it in the Field of Macro Molecules."

Electrical Engineers, Institution of, W.C.2. 5.30 p.m. F. J. Erroll and The Lord Forrester. "Some Projects favourable to Direct-Control Transmission and the Role of the British Electrical Industry in Relation thereto."

Physical Society, at the Royal Society of Arts W.C.2. 2.30 p.m. Hope Bagend. "Concert Hall Acoustics."

FRIDAY, NOVEMBER 5. Mechanical Engineers, Institution of, S.W.1. 6 p.m. J. M. Newton. "On the Accuracy of Gear Hobbing Machine Tables."

Physics, Institute of, 47, Belgrave Square, S.W.1. 6 p.m. Dr. W. H. Willott. "The Spectral Transmission of Coloured Glasses."



LIFE-BOAT FACTS

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Col. A. D. Burnett Brown, M.C., T.D., M.A., Secretary.

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4781

FRIDAY, NOVEMBER 5, 1948

Vol. xcvi

MEETINGS OF THE SOCIETY DURING THE NEXT FORTNIGHT

WEDNESDAY, NOVEMBER 10TH, at 2.30 p.m.—“SOCIAL AND ECONOMIC ASPECTS OF INDUSTRIAL DESIGN”, by R. S. Edwards, Ph.D., A.R.C.S., Chairman of the Council of Industrial Design. The Hon. Lady Cripps, G.B.E., will preside.

THURSDAY, NOVEMBER 11TH, at 2.30 p.m. (joint meeting of the India, Pakistan and Burma Section and the East India Association).—“THE LANGUAGES OF THE INDIAN SUB-CONTINENT”, by Alfred Master, C.I.E., M.A., I.C.S. (retd.). Sir Atul C. Chatterjee, G.C.I.E., K.C.S.I., a Vice-President of the Society, will preside.

TUESDAY, NOVEMBER 16TH, at 2.30 p.m. (Dominions and Colonies Section).—“RECENT SCIENTIFIC DEVELOPMENTS IN SOUTH AFRICA”, by Basil F. J. Schonland, C.B.E., M.A., Ph.D., F.R.S., President, South African Council of Scientific and Industrial Research.

WEDNESDAY, NOVEMBER 17TH, at 2.30 p.m. (Cobb Lecture).—“THE GREAT LIBRARIES OF THE WORLD AND THEIR FUNCTION”, by Arundell Esdaile, M.A., Hon.Litt.D., Past-President of the Library Association. Sir Frederic G. Kenyon, G.B.E., K.C.B., Litt.D., D.Litt., Ph.D., LL.D., will preside.

After the meeting tea will be served in the library to enable Fellows to meet the Librarian and to see the new facilities that are available.

“DESIGN AT WORK” EXHIBITION AND HANDBOOK

As already announced, the “Design at Work” Exhibition will be open until November 28th daily from 10 a.m. to 7 p.m. and on Sundays from 2 p.m. to 6 p.m.

A most attractive Handbook, of 40 pages and containing 28 illustrations, has been prepared and can be obtained price 1s. 6d. at the Exhibition or on application by post to the Secretary of the Society.

RESERVATION OF SEATS FOR LECTURE ON TELEVISION

It is anticipated that there will be a large attendance at the third lecture in the Cantor series on Television, at 8 p.m. on Monday, December 6th, when Mr. Jack Hulbert will be speaking on “Television and Entertainment”. In order, therefore, that seats may be reserved for them, Fellows who intend to be present are requested to notify the Secretary without delay stating whether they will be accompanied by one or two guests. If it is found that the demand for seats is unduly heavy, it may

be necessary to restrict admission to Fellows only, or to Fellows and one guest, as the case may be, in which event a further announcement will be made in the next issue of the *Journal*. Applications for reservations will be dealt with in the order in which they are received.

REFRESHMENTS FOR FELLOWS

A catering licence having been granted to the Society, it will now be possible to provide light refreshments in the Library for Fellows and their friends, which service was discontinued at the outbreak of war. In order to facilitate the necessary catering arrangements, it is requested that Fellows who wish to be served should notify the Housekeeper, Mr. Giddy, in advance of the date and time when they will require refreshments, and also of any guests whom they wish to bring with them. A charge of 1s. 6d. per head will be made for tea, and snacks at other times of the day, up to 5.30 p.m., on Mondays to Fridays only, can also be arranged.

It is hoped that Fellows will take every opportunity of availing themselves of this service, the continuance of which will depend on the support it receives.

BINDING COVERS FOR THE JOURNAL

Binding covers for Volume XCV of the *Journal* are now available, price 3s. 6d. each, post free, and may be obtained on application to the Secretary. Volume XCV ended with the issue of November 7th, 1947.

JOURNAL INDEX FOR TEN VOLUMES

An index of the *Journal* of the Society covering the years 1932-1942, Volumes LXXXI-XC, has now been prepared and can be obtained on application to the Secretary on payment of 5s.

OPENING OF THE "DESIGN AT WORK" EXHIBITION BY HER ROYAL HIGHNESS THE DUCHESS OF KENT

The Design at Work Exhibition was opened on Tuesday, October 26th, by Her Royal Highness The Duchess of Kent. Her Royal Highness was received at the entrance to Burlington House by Sir Harry Lindsay, Chairman of Council of the Society, Sir Charles Tennyson representing Dr. Edwards, Chairman of the Council of Industrial Design, and Mr. Gordon Russell, Master of the Faculty of Royal Designers for Industry, supported by the Mayor of Westminster, the Secretary of the Royal Academy, the Chief Designer of the Exhibition, and their ladies. At the entrance to the Exhibition galleries a bouquet was handed to Her Royal Highness by Miss Edwards, and Sir Harry Lindsay then presented the wives of the reception committee, with those who have been responsible for the organisation of the Exhibition and their ladies. Her Royal Highness then proceeded to the Central Hall and was there welcomed by Sir Harry Lindsay with the following Address:

"May it please Your Royal Highness—

"We, the Council of the Royal Society of Arts, the Council of Industrial Design

and the Faculty of Royal Designers for Industry, are indeed glad and proud to welcome Your Royal Highness to Burlington House this afternoon, and to invite you to open the Exhibition which we have jointly organised. It is indeed, for us, a memorable occasion. Although not by any means the first exhibition of industrial design, for the Royal Society of Arts have on many occasions during the past century sponsored exhibitions of this character, and the two exhibitions already organised by the Council of Industrial Design, 'Britain Can Make It' and 'Enterprise Scotland, 1947', have met with outstanding success, it is the first exhibition



A glass vase, designed by the late James Hogan, R.D.I., being presented to Her Royal Highness The Duchess of Kent by Mrs. Hogan on behalf of the Faculty of R.D.I.s

in this country which represents the importance of the designer himself and his work to the success of our national industries. British design has over many difficult years made great headway and won a great name for itself. Where it has failed, its failure has been due largely to a most serious national defect, namely, apathy in cultural matters—apathy on the part of many manufacturers who tend to fall back upon slight variations of past best sellers merely for safety's sake rather than enlist the imagination and creative thought of the trained designer in the pioneering of new products—new world leaders; apathy on the part of the consuming public which has in the past contributed in no small way to the slow development of good design, although recent improvements in the standards of dress of the ordinary woman, and in the utensils and equipment for use in the modern kitchen, show that the housewife to-day is taking a far more critical and enlightened view than ever before.

"Design at Work", as our exhibition is called, is not propagandist. Although the exhibits are all the work of Royal Designers for Industry, or R.D.I.'s as they are popularly called and known, the objective is not just to display the work of R.D.I.'s as such, but rather to illustrate the importance of the designer as an essential factor in national industry. If this story is to be told at all, it must be told well. It is a complex story, with many facets. In fact, it is essentially a series of stories, each of which illustrates one or another aspect of the general theme. Each story is based on a definite industry calling for first-class design in simple or compound materials; each material used has its own inherent limitations; and the Exhibition brings out clearly the essential teamwork by means of which these limitations are



*Her Royal Highness being shown the model of the D.H. 108
"flying wing" by Sir Geoffrey de Havilland, R.D.I.*

overcome and a successful contribution is made to the design requirements of the industry.

"Manufacturer, designer, production and sales managers, research engineers, skilled craftsmen, wholesaler, retailer and the general public are all members of this team. Each member contributes his or her quota to the success of the ultimate product. It is essential that the whole team should appreciate the national importance of British design of first-class quality and that each member should be inspired by a single ideal, that only the best will do. That is the story which this Exhibition is planned to tell. It is a good story. We feel that it is told in the right setting, here in Burlington House, by courtesy of the President of the Royal Academy. We feel, moreover, and we hope, that 'Design at Work' will prove to be a worthy introduction to 'The Festival of Britain, 1951', to the success of which so much of our national genius is devoted.

"To Your Royal Highness we express our sincere gratitude that you have come personally to honour this ceremony with your presence; and I now ask Your Royal Highness to be graciously pleased to declare the Exhibition open".

Her Royal Highness then opened the Exhibition in the following words:

"Sir Harry Lindsay, Ladies and Gentlemen,

"I thank you for your kind words of welcome. It gives me great pleasure to be with you to-day, and to meet the organisers of this Exhibition, which has been so aptly called, 'Design at Work'.

"The Royal Society of Arts have indeed been fortunate in securing the co-operation of the Council of Industrial Design, and the expert assistance of their distinguished Faculty of Royal Designers for Industry, whose work in planning the Exhibition and in skilful designing for the industries of Great Britain, we are to see this afternoon.

"A hundred years ago, the Royal Society of Arts arranged an early counterpart of this Exhibition, which was one of the first of its kind to be held in this country. It was a fore-runner of the Great Exhibition of 1851, with which the Prince Consort was so closely associated; in the same way that this Exhibition to-day foreshadows the Festival of Britain which is to take place in 1951.

"Since those early beginnings, we have seen great advances in every field; the fine traditions of British craftsmanship have been proudly upheld; and British designers have fashioned for themselves a name which has come to be respected throughout the world.

"It is still, however, of the utmost importance to our country that this honourable reputation should be preserved and enhanced, and it is with the object of recording how splendidly that standard has been maintained, that this Exhibition has been planned.

"I am happy to be able to bring you this afternoon the good wishes of your President, the Princess Elizabeth, whose close interest in the Royal Society of Arts is well known to you all; and to these I would like to add my own, and my most sincere hopes for the success and prosperity of 'Design at Work', which I now declare open".

Her Royal Highness was then conducted round the Exhibition. Members of the Faculty of R.D.I.s were presented when she arrived at their stands, and Mrs. Hogan, on behalf of the Faculty, presented Her Royal Highness a glass vase which had been designed by her husband. It had been inscribed with Her Royal Highness's monogram and coronet specially designed for the occasion by Mr. Milner Gray.

A REVIEW OF THE EXHIBITION

The "Design at Work" Exhibition has been compared with those small Society of Arts exhibitions of a hundred years ago which heralded the Great Exhibition of 1851. The comparison is apt, but "Design at Work" is something more than a curtain-raiser to the 1951 Festival of Britain. In two ways, it is unique. It is the first exhibition to be devoted exclusively to the work of the Royal Designers for Industry, whose Faculty now approaches its eleventh birthday. The occasion has not been confined to a mere assembly of their work. Many of the examples have been used in a visual analysis

of the process of design and to indicate the essential place of the designer in modern industry. Much has been written upon this theme, but this is the first time that it has been stated for the benefit of the manufacturer and the consumer public in concrete terms.

In assessing the value of this exhibition, it is important to bear this in mind. "Design at Work" is not a parade of design. It is a statement on the *process* of design. There are naturally a number of individual exhibits which will be admired in themselves for their beauty or their fitness. There is the design of the exhibition itself by Milner Gray, planned and set in four galleries with a restraint which at no time allows the display to overshadow the exhibits. In this respect it pleases and succeeds where "Britannia Can Make It" failed to strike a proper balance because of its over-emphasised effects. There is the Alanbrooke Sword of Honour with its simple cruciform design by R. Y. Goodden which is one of the best things in the



A view of the London Transport display

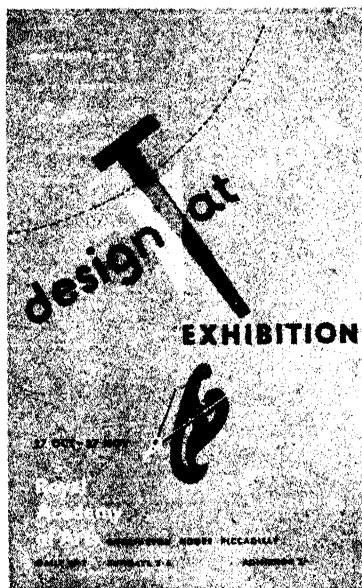
exhibition. There is blown glass by the late James Hogan who has exploited the ductile qualities of his material with beautiful effect. There are book designs, bindings and covers by Sir Francis Meynell, Douglas Cockerell, Milner Gray and Percy Delf Smith. All these will give pleasure for their fineness and their beauty,

But the essential message of the Exhibition is told in a series of case histories which, by means of drawings, mock-up models, prototypes and descriptive copy show how a variety of products grew from their inception to the finished model, ready for quantity production. The Radio Time exhibit by Wells Coates describes the evolution of a small bedside radio set which incorporates an alarm clock. It shows how the technician, the engineer, the designer and the salesman were linked within the pattern of that evolution. A teapot designed by Keith Murray for the Wedgwood "Commonwealth" service shows the changes to which even a piece of tableware may be subject between its inception and production. The story moves from the

first prototype, a footless hybrid with a strong suggestion of coffee pot ancestry, to the final model which satisfied the requirements of large-scale production, yet remained in the Wedgwood tradition.

The theme of the designer as an integral unit of a production team, and the meaning of good design (that which "works well, looks well, lasts well and sells well") is further enlarged by the case histories of utility furniture by Gordon Russell, school furniture and a television set by Dick Russell, and a new light fitting by A. B. Read.

The case for the designer as an essential technician is nowhere more clearly emphasised than in the sphere of aircraft design. Here, we find the designer more closely integrated with a necessarily complex system of evolution than perhaps in



The Exhibition poster designed by Ashley Havinden, R.D.I.

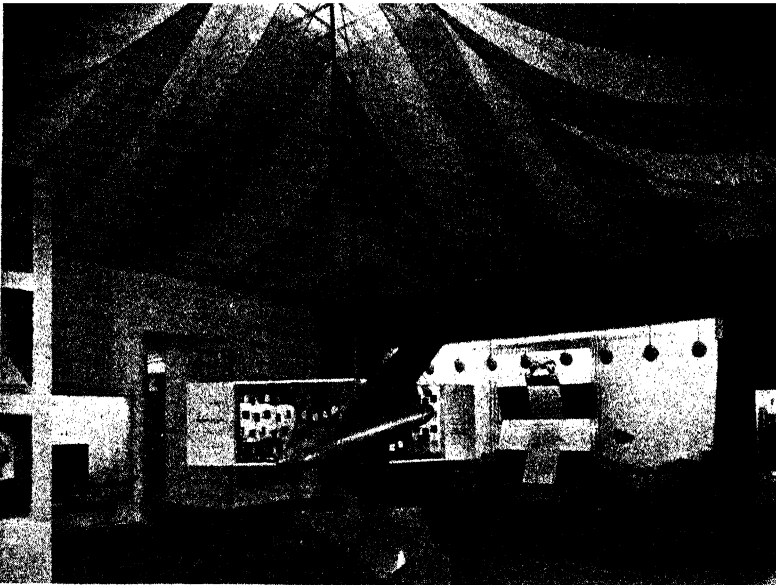
any other field of manufacture. Because the design is all important, we find him at the hub, the co-ordinator of a team. Surely there is a moral here, yet, the De Havilland exhibit, which shows, by means of a series of models, the ancestry of the jet-propelled D.H. 108, fails to get this point home.

One feels too that some of the smaller case histories have not contributed as much as they might to the general statement of the exhibition. The textiles and yarns of Ethel Mairet might have been made to say a good deal more than they do. They were created in the conviction that the hand and machine techniques should be complimentary to one another, that the function of the artist is to accept the machine, and that the machine must work with the artist as its brain. Two examples of pottery designed and decorated by Susie Cooper stand mute, telling nothing of a designer

who has succeeded both artistically and materially because her creative sense is linked with a sound practical knowledge of production technique and market requirements.

But if the exhibits do not always state their message as loudly and clearly as they might, this is probably due to the limited effect of what can be achieved by means of captions. Unless these are severely restricted, they are likely to remain unread. The work of some forty exhibitors, which is the limit of the Faculty, is a slender foundation on which to build an exhibition of this nature. "Design at Work" was also devised and assembled in the remarkably short space of six months. Faced by these initial difficulties, it represents a considerable achievement.

Whatever the pessimists may say, there are signs of an awakening in this country of



The display, showing the centre piece in Room Three of the Exhibition with the Utility Furniture display in the background

design and craft consciousness. The process has been going on for a number of years, and bodies such as the Royal Society of Arts and the Design and Industries Association have played no small part in fostering it. It is to be hoped that "Design at Work" will be followed by more of its kind. The craftsmanship of the pre-machine age largely arose from the fact that the craftsman commonly designed what he made. The subsequent and complete divorce of these two functions was illogical. We are now beginning to see that. We cannot put the clock back, but we can restore the ancient balance by re-admitting the creative artist, the designer, to his logical place in the scheme of manufacture. That is broadly the lesson which we have to learn and upon the acceptance of that lesson by all concerned, the industrial survival of this country in no small measure depends.

MALCOLM LOGAN

REPORT OF THE SOCIETY'S EXAMINATIONS FOR THE SESSION 1947-1948.

INTRODUCTION

The outstanding feature of this year's report on the Society's examinations is the striking increase in the number of entries from 87,992 in the previous year to 128,645—an increase of over 46 per cent. Though a considerable part of this increase is due to the growing use made of the Society's examinations by several departments of the Civil Service—itsself an indication of the standard and reputation of the examinations—there is still left, after allowance has been made for this factor, a very satisfactory increase in practically all branches of what has hitherto been regarded as the normal work of the Examinations Department. In fact, in whatever way the figures are considered, they afford strong evidence of the value attached to the Society's certificates.

Since the inauguration of the Society's examinations over ninety years ago, several influences have tended to lessen their scope—the concentration on examinations in subjects related to commercial education, as distinct from those more definitely technological in character which have since been developed by the City and Guilds of London Institutes; the growth of the local examining Unions; the establishment of a number (still increasing) of professional associations, each with its own scheme of examinations—thus, in accountancy alone, the period has witnessed the establishment of the Institute of Chartered Accountants, the Society of Incorporated Accountants, the Association of Certified and Corporate Accountants and the Institute of Cost and Works Accountants; finally, in the last half century, the advocacy, at any rate as a test of progress, of the claims of the “internal” examination with its reputed freedom from what is sometimes described as the cramping effect of the external examination. Yet, all these influences notwithstanding, the entries for the Society's examinations have shown a steady increase decade by decade. No doubt this is partly due to the wider educational facilities available at home and abroad. But much must also be attributed to the continued belief that the external examination has still an important function to perform. A clear instance of this is where it is desired to obtain a certificate of competency from a body whose examinations are readily available and their standard recognised and respected throughout the country. As has been indicated above, this need has, to some extent, been met by the establishment of professional associations, but, outside their highly specialised requirements, there is still ample scope, both in single subjects and in appropriate groups of subjects, for the Society. A recent example is the Civil Service proficiency tests conducted by the Society, and another one, in which the first examination has yet to be held, is the new scheme for the award of teacher's certificates in Shorthand or Typewriting.

N.B.—The Examiners' Reports have been omitted from the following pages. The complete report will be published in a separate pamphlet by the Examinations Department, and a copy will be sent to any Fellow who applies to the Secretary.

Apart from the foregoing types of cases, it must be recognised that, whereas an internal examination may be appropriate in certain circumstances, where the teaching institution is suitably staffed and has a widely recognised standing, there are many cases where these and other necessary conditions do not exist. This accounts for many of the large number of entries in what are described as the "ordinary" examinations.

There is one attribute, peculiar to the external examination, which is worthy of note. It is the stimulus given to the teaching institutions to provide classes in a subject or group of subjects, which is afforded by the publication of clear syllabuses, based on careful enquiries as to what is required. An example of this is the rapidly increasing number of entries in the schemes of studies for employees in Road Transport Undertakings.

Whether or not the foregoing reasons for the continued success of the Society's examinations are accepted, as, at any rate partial explanations, the fact of the continuance remains, and one essential factor contributing to it is the efficiency and skill with which the work of the Examinations department has always been conducted; the latest instance of this, for which the staff of the department deserves congratulation, is the manner in which they have dealt with this year's abnormal increase.

J. W. R.

LIST OF ENTRIES, 1947-1948

The total number of single-subject entries for the various examinations, conducted by the Society between November, 1947 and July, 1948 was 128,645, as compared with 87,992 for the corresponding series in the period from November, 1946 to July, 1947.

The following table gives a detailed comparison:

	1947-1948	1946-1947
(a) Ordinary (Single Subject) Examinations	*88,027	73,400
(b) Senior School and School Commercial Certificate	7,670	6,902
(c) L.C.C. and Home Counties Grouped Course	7,327	5,756
(d) Oral Examinations	556	453
(e) Transport Examination	2,120	1,364
(f) English for Dutch Students in Holland	55	117
(g) Civil Service Proficiency Tests in Shorthand and Typewriting (March, 1948)	8,350	—
(h) Polish School of Foreign Trade—special examinations in Stage III Book-keeping and Marine Insurance.	60	—
(i) British European Airways—special oral examinations in European languages.	80	—
(j) Ministry of Supply—examination for establishment of Temporary Clerks.	14,400	—
	<hr/> 128,645 <hr/>	<hr/> 87,992 <hr/>

* This includes approximately 8,000 entries for the Civil Service Proficiency Tests in Shorthand and Typewriting at the Autumn Series, 1947.

The phenomenal increase of 40,653 in the entries for the session, shown by the above figures, places the grand total of these entries as the highest in the history of the Society's examinations, the previous highest being in 1931, when the total was 107,990.

The present total includes a number of temporary or non-recurrent items, shown in

the last three series in the table. The Civil Service Proficiency Tests may, however, be expected to continue for some years at least, and non-recurrent or quasi-temporary tests, such as the three referred to above, may materialise—one such, a written and oral examination in Germany for officials of the Control Commission in Germany, being already arranged for December next.

Moreover, the entries for the long established series (the first four items in the table) with a total this session of 95,580 compares not unfavourably with the total for the same four items in 1931 of 107,990. (For the purpose of a strict comparison, the item of approximately 8,000 Civil Service candidates at the Autumn, 1947 Series, has been omitted from this total of over 95,000.) As has been the case in previous sessions, the increase has taken place in each series (except the examinations in Holland), in itself a very satisfactory feature, as is also the fact that the increase in the Ordinary Series took place principally in the two higher stages.

It was gratifying that H.M. Treasury and the Government departments found the war-time proficiency tests so useful that they approached the Society last autumn to renew the tests—this time on papers identical in type and standard to those set in the Advanced Stage of the Ordinary Series. These examinations will continue to take place in both Shorthand and Typewriting annually in June and December.

Further interesting developments were the establishment examinations in four subjects for the Ministry of Supply and the special oral examinations for British European Airways in almost all European languages used on one side or the other of the Iron Curtain. These oral examinations are continuing. A small special examination was also carried out for the Polish School of Foreign Trade in Advanced Book-keeping and Marine Insurance.

The Society was very glad to accept the generous offer by the International Summer Schools Society of a number of Travelling Bursaries to be awarded annually to the best candidates at the Society's Advanced examinations in French, German, Italian and Spanish. The scheme was put into partial operation this summer—the awards made are given on page 790.

PAPERS WORKED, 1947-1948

The number of papers worked, as distinct from entries, at the Society's examinations between November, 1947 and July, 1948 was 117,641.

The details for the various series are:

(a) Ordinary (Single Subject Examinations)	83,434
(b) Senior School and School Commercial Certificate	6,550
(c) L.C.C. and Home Counties Grouped Course	6,723
(d) Oral Examinations	534
(e) Transport Examinations	1,962
(f) English for Dutch Students in Holland	55
(g) Civil Service Proficiency Tests in Shorthand and Typewriting (March, 1948).	7,159
(h) Polish School of Foreign Trade—special examinations in Stage III Book-keeping and Marine Insurance.	54
(i) British European Airways—special oral examinations in European languages.	77
(j) Ministry of Supply — examination for establishment of Temporary Clerks.	11,093

117,641

The figures for *papers worked* shown above and throughout the report are only approximately correct. About 1,150 papers worked at overseas centres, the return of which has been delayed, will require to be added.

Notes on the various series of examinations follow.

ORDINARY (SINGLE SUBJECT) EXAMINATIONS

Examinations will be held in 1949 at Easter, at Whitsun, at the Summer Series in July, and in the Autumn.

Details of this year's results are shown in the table on page 794.

Full particulars are given in the Programme for 1949, which may be obtained from the Examinations Officer, Royal Society of Arts Examinations Department, 28 Victoria Street, London, S.W.1.

ORAL EXAMINATIONS

An oral test is compulsory in the Advanced Stage of French, German, Italian, Russian and Spanish. The number of candidates presenting themselves for examination this year was 534, of whom 156 passed with distinction, 283 passed and 95 failed.

An important part of the Oral Test is the taking down of a passage dictated by the Examiner in the foreign language. It is found that many candidates who attend the Oral Tests have had the advantage of residence in the foreign country, and in consequence possess an extensive vocabulary and an excellent colloquial knowledge of the language; but in many instances they have not paid sufficient attention to the grammar, and on account of this weakness they frequently fail in the dictation because their verbs and terminations are faulty.

SPECIAL EXAMINATIONS

Apart from the Ordinary (Single Subject) Examinations, the Society conducts a number of special examinations, particulars of which may be obtained from the Examinations Officer. Details of this year's results are shown in the tables on pages 791-793.

Senior School and School Commercial Certificate.—These examinations were instituted in 1927 and are held annually in March and July (the Senior School Examinations are held in July only). They are intended for pupils of day schools, and candidates are required to pass in at least seven subjects, including certain compulsory subjects.

Grouped Course Examinations.—A Grouped Course Examination, instituted in 1927 for students of the London County Council Junior Commercial and Junior Technical Institutes, is conducted by the Society each year; this series was later extended to similar Institutes in the Home Counties. Examinations will be held in 1949 at the Whitsun and Summer Series.

Examinations for the Staffs of Road Transport Undertakings

Scheme "A".—The Society was, in 1935, asked to hold examinations, and issue certificates to successful candidates, in a three-year course of study which was designed to enable transport employees to gain a knowledge of road transport, both in its immediate and wider aspects. All students completing the course successfully are awarded the "Diploma in Road Transport", which is considered a qualification in the road transport industry.

The first examination was held in May, 1936, and the examinations have been carried out in each succeeding year, with the exception of 1942, when they lapsed, owing to the small number of candidates interested. They will be continued in 1949 at the Whitsun Series.

Scheme "B".—In 1945, the Road Transport Education Conference, representative of leading organisations in the road transport industry and in education, asked the Society to set up another series of examinations in connection with the Conference's scheme of vocational instruction for employees in the industry. The examinations are of a practical character, designed for those who are not intending in the first instance to proceed to higher examinations.

The examinations were first held in May, 1946, and will be carried out in succeeding years at the Whitsun Series.

(The managements of the three Transport periodicals, "Bus and Coach", "Transport World", and "The World's Carriers", in addition to continuing their offer of money prizes in Scheme "A", are generously offering similar prizes to Scheme "B" candidates.)

MEDALS

At this Session's examinations 34 candidates qualified for the Silver Medal in the Advanced Stage and 65 for the Bronze Medal in the Intermediate Stage. They have been awarded the special medal certificate, together with a money prize, to the value of £1 10s. in the case of the Silver Medal and of 15s. in the case of the Bronze Medal.

The Clothworkers' Company generously continued their gift towards the cost of the money prizes in 1948.

In 1949 and after, the issue of Silver and Bronze Medals will be resumed, in place of the money prizes which were supplied as a war-time measure.

SPECIAL PRIZES

THE DUKE OF CONNAUGHT PRIZE

This Prize consists of Life Fellowship of the Society, together with a gift of £5 in books to each successful competitor. Up to four Life Fellowships and gifts of books are offered annually. The conditions of the award are as follows:

- (1) Candidates of any age may compete.
- (2) Candidates must be of British nationality.
- (3) The prizes are awarded to the candidates who obtain the highest total of marks at the Society's examinations in any one year in three of the following subjects in the Advanced Stage (Stage III)—Economic Geography, Economic and Social History, Economic Theory, English, History of the British Empire, History of the United States of America, a foreign language (only one foreign language may be offered).

[Candidates must obtain a First- or Second-class pass in all three subjects.]

Mr. Frederick J. W. Baggs, a candidate of the South Dorset Technical College, Weymouth, has been awarded a Life Fellowship of the Society and a gift of £5 in books for the highest aggregate of marks obtained in 1948 in the Advanced Stage of the subjects detailed:

First-class Certificates in English and Economic Geography, with a Second-class in French (with Distinction in the Oral Test).

(The Council of the Society has decided, in view of the almost negligible entries for this scheme to suspend the offer of prizes until the number of eligible candidates appears to justify the resumption of the offer).

PRIZES IN HISTORY OF THE BRITISH EMPIRE AND HISTORY OF THE UNITED STATES OF AMERICA

The Society offers the following prizes to candidates annually, under the conditions detailed:

History of the British Empire—

Stage III (Advanced), 1st Prize £20, 2nd Prize £10; Stage II (Intermediate), 1st Prize £10, 2nd Prize £5; Stage I (Elementary), 1st Prize £6, 2nd Prize £4.

History of the United States of America—

Stage III (Advanced), Single Prize £15; Stage II (Intermediate), Single Prize £10; Stage I (Elementary), Single Prize £5.

The prizes are awarded for the best papers in each stage of the subject at (a) any of the series of the Society's Ordinary Examinations, or (b) the appropriate stage of School

and Senior School Commercial Certificate Examinations in any one year, subject to the following conditions:

(i) Age Limit :

For Stage III—No age limit.

For Stage II and Senior School Commercial Certificate Examinations—
No age limit.

For Stage I and School Commercial Certificate Examinations—Candidates must not have reached the age of 18 at the date of examination.

(ii) Students of British nationality only are eligible.

(iii) No prize is awarded to a candidate whose work in the opinion of the Society's examiners is not sufficiently meritorious.

(iv) No prize is awarded unless the Council of the Society considers the numbers of entries adequate.

(v) No prize is awarded to a teacher of History, or in Stages III and II to a candidate who, having reached the age of 18 at the date of examination, is following a full-time course of study in cognate subjects.

(For 1949 and after, Condition (v) will be modified as follows:

No prize will be awarded to a candidate who is, or has been, a teacher, whether full-time or part-time, nor to the holder of a degree in History or cognate subjects, nor in Stages III and II to a candidate who having reached the age of 18 at the date of examination is following a full-time course of study in cognate subjects.)

The following awards were made in 1948:

History of the British Empire Stage II (Intermediate)—

1st Prize of £10—Michael Charles Butler, Orange Hill Secondary Boys' School, Hendon.

2nd Prize of £5—No award.

History of the British Empire Stage I (Elementary) and School Commercial Certificate—

1st Prize of £6—John Carter, George Gascoigne Secondary School, Walthamstow.

2nd Prize of £4—David Kinder, Palatine Secondary Technical School, Blackpool.

(No prizes were awarded in the Advanced Stage.)

History of the United States of America Stage II (Intermediate)—

Prize of £10—Pauline Ramsden, Grammar School, Fleetwood.

History of the United States of America Stage I (Elementary)—

Prize of £5—Joyce Whitaker, Public Secondary Girls' School, Plymouth

(No prize was awarded in the Advanced Stage.)

TRAVELLING BURSARIES

(Offered by the International Summer Schools Society and awarded to the following candidates on the results of the Easter and Whitsun Series, 1948):

French III—

Donald Hoyle (Technical College, Huddersfield).

Monica Diment (London External).

German III—

Norman Smith (City of Liverpool College of Commerce).

Margaret Evans (University College, Southampton).

**Italian II—*

Muriel Currey (West London College of Commerce).

Spanish III—

Alice Leigh (City of Birmingham Commercial College).

*This Bursary was awarded in 1948 in the Intermediate Stage.

TABLE OF RESULTS OF THE L.C.C. GROUPED COURSE EXAMINATIONS, 1948

COMMERCIAL AND GENERAL GROUPS

Subjects	Passed with Credit			Passed			Not Passed			Papers worked for Whitsun and Summer combined
	Whit-sun	Summer	Total	Whit-sun	Summer	Total	Whit-sun	Summer	Total	
Arithmetic ...	7	21	28	20	55	75	11	147	158	261
Book-keeping ...	1	18	19	7	37	44	11	60	71	134
Economic Geography	—	—	—	—	5	5	6	23	29	34
English ...	4	11	15	25	185	210	9	182	191	416
French ...	—	2	2	4	24	28	2	21	23	53
History ...	—	—	—	5	3	8	—	5	5	13
Shorthand, 60 w.p.m.	—	11	11	—	19	19	—	18	18	48
" 50 w.p.m.	—	23	23	1	51	52	1	79	80	155
Typewriting ...	—	35	35	—	51	51	—	165	165	251
Totals ...	12	121	133	62	430	492	40	700	740	1,365

TECHNICAL GROUP

Subjects	Passed with Credit			Passed			Not Passed			Papers worked for Whitsun and Summer combined
	Whit-sun	Summer	Total	Whit-sun	Summer	Total	Whit-sun	Summer	Total	
English ...	9	46	55	64	493	557	13	184	197	809
Mathematics ...	29	128	157	16	142	158	9	128	137	452
Science ...	3	28	31	4	23	27	2	53	55	113
Technical Drawing ...	9	177	186	33	324	357	35	213	248	791
Trade Calculations ...	14	135	149	10	137	147	7	65	72	368
Totals ...	64	514	578	127	1,119	1,246	66	643	709	2,533

TABLE OF RESULTS OF THE HOME COUNTIES GROUPED COURSE EXAMINATIONS, 1948

COMMERCIAL AND GENERAL GROUPS

Subjects	Passed with Credit			Passed			Not Passed			Papers worked for Whitsun and Summer combined
	Whit-sun	Summer	Total	Whit-sun	Summer	Total	Whit-sun	Summer	Total	
Arithmetic ...	—	30	30	1	48	49	1	26	27	106
Book-keeping ...	—	29	29	1	38	39	1	8	9	77
Economic Geography	—	—	—	—	3	3	—	4	4	7
English ...	—	3	3	2	76	78	—	24	24	105
French ...	—	11	11	—	20	20	—	12	12	43
History ...	—	—	—	—	—	—	—	4	4	4
Shorthand, 60 w.p.m.	—	9	9	1	3	4	—	2	2	15
" 50 w.p.m.	—	6	6	—	1	1	—	8	8	15
Totals ...	—	88	88	5	189	194	2	88	90	372

TECHNICAL GROUP

SUBJECTS	Passed with Credit			Passed			Not Passed			Papers worked for Whitsun and Summer combined
	Whit-sun	Sum-mer	Total	Whit-sun	Sum-mer	Total	Whit-sun	Sum-mer	Total	
English	38	24	62	269	247	516	103	40	143	721
Mathematics	90	142	241	97	101	198	100	58	158	597
Science	68	48	116	74	49	123	46	29	75	314
Technical Drawing ..	57	81	138	168	147	315	169	55	224	677
Trade Calculations ..	60	15	75	35	11	46	26	—	26	147
Totals	322	310	632	643	555	1,198	444	182	626	2,456

TABLE OF RESULTS OF THE TRANSPORT EXAMINATIONS, 1948

Scheme "A"						Papers Worked.	1st Class.	2nd Class.	Not Passed.
Group I.—Economic Geography .. ..	..	..	..	..	..	46	7	21	18
Commerce and Business Routine .. ..	..	..	..	..	..	47	1	31	15
Elements of Transport .. ..	..	..	..	..	..	42	7	17	18
Group II.—Principles of Accounts .. ..	..	..	..	..	..	19	3	10	6
Law relating to Road Transport .. ..	..	..	..	..	..	19	9	9	1
Economics applied to Road Transport ..	..	..	..	..	..	24	8	9	7
Group III.—Elementary Statistics .. ..	..	..	..	..	..	18	2	12	4
Law of Inland Carriage .. ..	..	..	..	..	..	21	5	12	4
Road Transport Operation .. ..	..	..	..	..	..	23	12	9	2
TOTALS .. ..	..	..	..	..	..	259	54	130	75
Scheme "B"									
1st Year.—Road Transport Operation (Passenger)	..	..	..	..	..	464	80	227	157
„ „ „ (Goods) .. ..	..	..	..	..	..	46	13	25	8
Elements of Road Transport Engineering	..	..	..	..	..	290	80	145	65
Road Transport Accounts and Statistics	..	..	..	..	..	342	30	184	128
2nd Year.—Road Transport Operation (Passenger)	..	..	..	..	..	169	17	81	71
„ „ „ (Goods) .. ..	..	..	..	..	..	22	11	11	—
Elements of Road Transport Engineering	..	..	..	..	..	88	30	46	12
Road Transport Accounts and Statistics	..	..	..	..	..	131	9	67	55
3rd Year.—Road Transport Operation (Passenger)	..	..	..	..	..	44	16	17	11
„ „ „ (Goods) .. ..	..	..	..	..	..	19	7	10	2
Elements of Road Transport Engineering	..	..	..	..	..	31	1	21	9
Economics applied to Road Transport ..	..	..	..	..	..	57	11	30	16
TOTALS .. ..	..	..	..	..	..	1,703	305	864	534

**SENIOR SCHOOL AND SCHOOL COMMERCIAL CERTIFICATE
EXAMINATIONS, 1948.**

NUMBER OF FULL CERTIFICATES AWARDED.

SENIOR SCHOOL COMMERCIAL CERTIFICATE.

Candidates, 14; First-class certificates, None; Second-class certificates, 6

SCHOOL COMMERCIAL CERTIFICATE.

Candidates, 816; First-class certificates, 67; Second-class certificates, 407.

**TABLE SHOWING THE NUMBER OF PAPERS WORKED IN THE SENIOR SCHOOL AND
SCHOOL COMMERCIAL CERTIFICATE EXAMINATIONS IN MARCH AND JULY, 1948,
TOGETHER WITH THE RESULTS.**

SUBJECTS	SENIOR SCHOOL CERTIFICATE EXAMINATION.				SCHOOL CERTIFICATE EXAMINATION.							
	JULY.				MARCH.				JULY.			
	Number of Papers worked.	Passed 1st Class	Passed 2nd Class.	Failed.	Number of Papers worked.	Passed with Credit.	Passed	Failed.	Number of Papers worked.	Passed with Credit.	Passed.	Failed.
Arithmetic ...	17	6	7	4	35	9	15	11	776	233	311	232
Book-keeping ...	16	4	7	5	35	19	12	4	760	295	236	229
Economic Geography	14	3	9	2	35	3	18	14	778	76	348	354
English ...	69	8	46	15	35	3	26	6	726	51	502	173
Commerce ...	14	3	11	—	28	2	20	6	565	28	354	183
French* ...	8	2	6	—	6	1	5	—	445	81	234	130
German ...	—	—	—	—	—	—	—	—	—	—	—	—
Spanish ...	—	—	—	—	—	—	—	—	32	11	12	9
History ...	—	—	—	—	4	—	3	1	373	24	177	172
History of the British Empire	—	—	—	—	—	—	—	—	66	2	33	31
History of the U.S.A.	3	1	2	—	—	—	—	—	14	5	6	3
Mathematics ...	1	—	1	—	—	—	—	—	269	46	104	119
Natural Science ...	—	—	—	—	1	—	1	—	130	10	37	83
Shorthand†	—	—	—	—	—	—	—	—	—	—	—	—
100 & 80 w.p.m.	40	18	17	5	—	—	—	—	—	—	—	—
60 w.p.m. ...	—	—	—	—	15	5	8	2	271	92	95	84
50 w.p.m. ...	—	—	—	—	20	4	11	5	325	39	94	192
Typewriting ...	37	5	13	19	33	14	5	14	550	223	144	183
Welsh ...	—	—	—	—	—	—	—	—	4	3	—	1
Totals ...	219	50	119	50	247	60	124	63	6,084	1,219	2,687	2,178

* 22 Candidates took the Oral Examination in French. 3 passed with Credit, 18 Passed and 1 Failed.

† The figures in the Senior School columns for First and Second Class are for passes at 100 and 80 words per minute respectively; in the School columns the figures are for Passed with Credit and Passed at the speeds shown. (A credit is awarded for high marks for Shorthand notes at 50 and 60 words per minute.)

[The above details do not include the papers worked in Jamaica, which have not yet been received. 529 papers in the Senior School and 472 in the School Examination are awaited.]

DETAILS OF THE ORDINARY (SINGLE SUBJECT) EXAMINATIONS, 1948 (INCLUDING AUTUMN SERIES 1947).

[illegible]

THE STRUCTURAL RELATIONS OF SOME PLANT PRODUCTS

By Sir ROBERT ROBINSON, M.A., D.Sc., LL.D., P.R.S.



Nineteenth Ordinary Meeting, Wednesday, April 21st, 1948

TRUEMAN WOOD LECTURE

Sir HARRY LINDSAY, K.C.I.E., C.B.E., *Chairman of the Council of the Society, in the Chair*

THE CHAIRMAN: This lecture celebrates the memory of Sir Henry Trueman Wood, who was one of our most distinguished Secretaries—and in saying that I am saying nothing derogatory to Mr. Luckhurst, who is Sir Henry Trueman Wood's remote successor. In fact, I am also Sir Henry's successor, because after giving up the Secretaryship in 1917 he became Chairman of Council for a year. Shortly afterwards this annual lecture was inaugurated in his honour.

There have been many distinguished names of Trueman Wood Lecturers in the annals of this Society—names such as Lord Rutherford, Sir William Bragg, Sir James Jeans, Sir Thomas Holland, and many others. Sir Robert Robinson is the latest in this distinguished line. He is one of the most, if not the most, distinguished organic chemists of this country—indeed, of the world. I do not need to tell you all his accomplishments, for you know that he is President of the Royal Society and Waynflete Professor of Chemistry at Oxford, and that he has held professorial posts in Sydney, Liverpool, Manchester, London, and St. Andrews, as well as at Oxford. He is a Nobel prizewinner and also holds the Albert Medal of this Society. He is going to lecture to us on the subject of "The Structural Relationships of some Plant Products", which will be of general interest not only in itself but also in its bearing on a good deal of research work that is being done now on plant products throughout the Empire. Without further ado I will ask Sir Robert to address you.

The following paper was then read:

The title selected for this lecture is intended to be significant. The choice of "structural relations" instead of the more usual "theory of biogenesis" defines the scope of the pure organic chemist's contribution to the problem. He is entitled to draw attention to correspondences noted in the architectural plan of molecules of natural origin, and to draw some conclusions from the occurrence of recognisable structural units.

These must have some connection with biogenesis, or the mechanism of biosynthesis, but the details of the transformations cannot be disclosed by such enquiries. It is the task of the biochemist to elucidate the course of the katabolic and metabolic processes of the living cell, and they will prove, and have already proved, to be exceedingly complex; often very far removed from the simplified paper schemes of the synthetic organic chemist.

Whilst therefore we must be careful not to claim too much, it is equally necessary to insist on the value of the evidence we can marshal since it is apt to be overlooked by the biochemist and plant physiologist. The structures of the molecules synthesised in Nature have been experimentally determined and their comparative study is a contribution on the experimental side. It is not unsupported speculation and hypothesis so long as we restrict ourselves to the conclusions which are justified by the results; and though our judgment on that matter may sometimes be faulty,

it can be, and indeed, often has been, modified by discussion. All the examples mentioned in the sequel exhibit some feature which is thought to involve a "degree of coincidence" so noteworthy that a valid deduction is possible.

The following sections illustrate, first, various examples of the identification of structural units, and later a few applications to special groups of peculiar significance. In this matter the more complex structures give the more direct information, just as the rough architectural elements of a cathedral are apparent on inspection.

(1) *Polysaccharides, proteins, substances containing* — OMe, >NMe , $\text{:O}_2\text{CH}_2$, *and the like.*

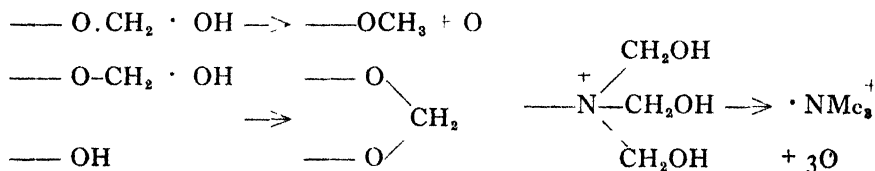
Nobody doubts that the structural unit of the polysaccharide is the simple sugar, aldose or ketose, or that the proteins are constructed from the amino-acids.

In general it is clear that O, N, S, always separate structural units, and therefore methoxy, methylimino (or even —NMe_3^+), or methylenedioxy groups can be simplified by dissections so as to leave the related hydroxy, or amino, or imino-compounds.

This is a convenient place to mention that in this discussion the use of the name of a reagent—as formaldehyde, acetone—always implies the addition of the word "equivalent"—as formaldehyde equivalent, acetone equivalent, etc.

Thus, formaldehyde might mean "glycine plus an oxidase" and acetone might mean, acetoacetic acid or acetonedicarboxylic acid (with decarboxylation), or dihydroxyacetone (with reduction), and there are many other possibilities.

It seems certain that O- and N-methylations are due at some stage to the operation of formaldehyde (or equivalent, this *punctilio* is not repeated below but must *always* be understood), though, of course, in particular cases it is often the result of trans-methylation. That only puts the origin of the methyl one stage back. The simplified version is:

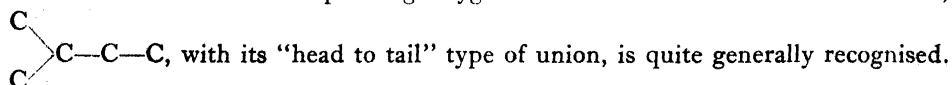


That plants have at their command a powerful methylating agent is shown by the occurrence of methyl, as an additional group, in the β -position to nitrogen in physostigmine and corydaline. It is apparent that the hetero-enoid system, $\text{N}=\text{C}=\text{C}^*$, has been methylated on the asterisked carbon atom and the process can be imitated in the laboratory by using methyl iodide in reaction with an appropriate unsaturated base. This latter reagent is a source of cationoid methyl, $\text{Me}^+\text{—I}$, and it may well be that the cationoid methyl of $\text{Me}^+\text{—NMe}_2\text{—R}^+$ or $\text{Me}^+\text{—SMe}^+\text{—R}^+$ is concerned in the phytochemical C-methylation.

An energetic agent is requisite and it may also be formaldehyde followed by reduction.

Fatty acids and the isopentane groups: Every student knows that the fatty acids contain long straight chains and an even number of carbon atoms. These facts,

which have been explained in a variety of ways, are clearly important but do not afford precise indications. The experimental work of Rittenberg and Bloch makes it probable that the reason for the regularity is that the acids are synthesised from acetic acid by condensation and reduction; $\text{CH}_3 \cdot \text{CO}_2\text{H} + \text{CH}_3 \cdot \text{CO}_2\text{H} \rightarrow \text{CH}_3 \cdot \text{CO} \cdot \text{CH}_2 \cdot \text{CO}_2\text{H} \rightarrow \text{CH}_3 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CO}_2\text{H}$, in the simplest case. The natural occurrence of the methyl ketones with an *odd* number of carbon atoms is embraced by this hypothesis. But the structural considerations alone were inadequate to suggest this type of make-up and it will be recalled that the prevalence of C_{18} -acids led to the suggestion of origin from $3\text{C}_6\text{H}_{12}\text{O}_6$. It is otherwise with the great *isopentane* family, the terpenes, sesquiterpenes, diterpenes, triterpenes, carotenoids and the corresponding oxygenated series. Here the structural unit,



It is unnecessary to press this point, as even the exceptions prove the rule.

Thus, among the carotenoids, or analogous substances such as astacin and crocetin, we find a normal farnesol chain, $\text{>}-\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2-\text{CH}=\text{CH}-\text{CH}_2-\text{OH}$, or a normal terpene or diterpene chain, doubled by "tail to tail" union. This emphasises the regularity of the chain and forcibly suggests a coupling of two halves at the point of doubling.

The *isopentane*, or *isoprene*, theory has frequently been used to assist in the determination of constitution and has not often proved an unreliable guide. Once again the exceptions are so few that they prove the rule, and, moreover, they are not always quite above suspicion as exceptions.

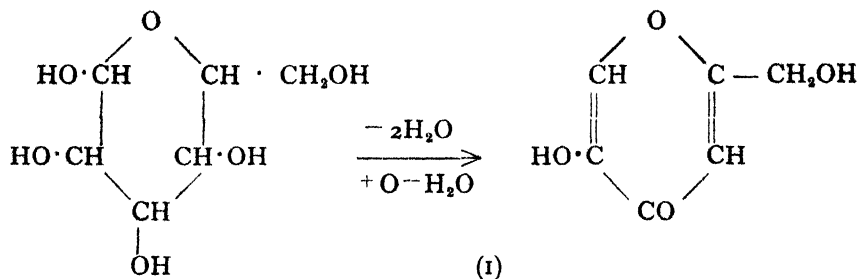
It is curious that with so much material to hand no very convincing picture of the relations of the terpenes, etc., or of the genesis of the *isopentane* units has been presented. The remarkable variety of transformations of the simpler systems, such as those of myrcene or occimene, that must be postulated, seems inconsistent with anything but the union of ethenoid groups and consequently there is a tendency to regard the hydrocarbons as sources of the oxygenated substances rather than *vice versa*. On the other hand, most theories of the biogenesis of the *isopentane* unit employ oxygenated progenitors. It is an unsolved problem.

Simple sugar units: Relationships among the sugars themselves are clear enough and need not be discussed at length. They are made more apparent by considerations of related configuration. This applies, for example, to the obvious relation of *d*-xylose to *d*-glucose from which may be deduced by analogy a similar relation between *l*-arabinose and *d*-galactose. A simple inversion may convert *d*-glucose into *d*-galactose, and so on. The one exception is *l*-rhamnose, the configuration of which is related to *l*-mannose and not to the *d*-glucose series.

The sugars are the first visible products of photosynthesis and hence we must regard them as the primary starting points of many syntheses.

Kojic acid (I), for example, is so simply derived from a hexose by dehydration and one stage of oxidation, that it seems certain that the substance is synthesised in this way. The fact that *Aspergillus oryzae* can be grown on a medium containing

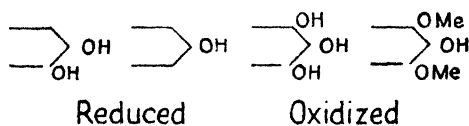
d-xylose instead of glucose does not affect this view, because it cannot be supposed that the relation between the food ingested and the metabolic product is a simple one.



It is tempting to regard aromatic nuclei, especially in the form of polyhydric phenols, as derived from the C_6 -units of sugars. The normal result of dehydration would be a trihydroxybenzene, $\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow \text{C}_6\text{H}_6\text{O}_3 + 3\text{H}_2\text{O}$, and it is easy to devise schemes, based on the usual rules for aldol condensations and preferred elimination of hydroxyl in the β -position to carbonyl, which lead to pyrogallol or hydroxyquinol derivatives. There is no strong evidence in favour of such devices or for the view, also under consideration, that the phloroglucinol orientation results from poly-acetic condensations.

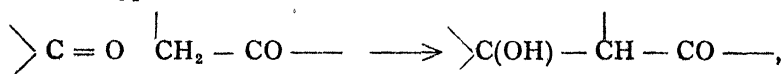
One argument in regard to the anthocyanin-anthoxanthin classes may be mentioned. Here we recognise the chain $\text{C}_6(\text{A})-\text{C}_3-\text{C}_6(\text{B})$ in which C_3 assumes all states of oxidation possible; $\text{C}_6(\text{A})$ has usually the normal state of oxidation (defined as that of any carbohydrate, or trihydroxybenzene) and $\text{C}_6(\text{B})$ is usually one O below the normal state of oxidation. These statements depend on the identification of cyanidin as the most widely distributed anthocyanidin and, to take another example, of quercetin as the most common flavonol.

We may envisage the group $\text{C}_6 \cdot \text{C}_3 \cdot \text{C}_6$ as having been built up by condensations of aldol type from simple carbohydrates. The orientation of hydroxyls in $\text{C}_6(\text{B})$ is found in many natural products based on $\text{C}_6 - \text{C}_3$ and examples are the following:



Hence the order of the process is supposed to be $\text{C}_6(\text{B}) \longrightarrow \text{C}_3 \longrightarrow \text{C}_6(\text{A})$ and this also explains why $\text{C}_6(\text{B})$ is one O below the normal state of oxidation.

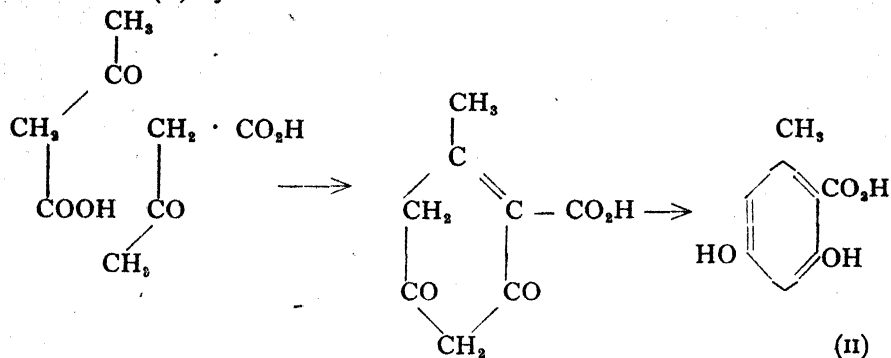
In the aldol type of condensation,



it is clear that the carbonyl "spearhead" is *reduced* whereas the state of oxidation of the acceptor is unaltered. In the above scheme the sugar progenitor of $\text{C}_6(\text{B})$ provides the carbonyl "spearhead". It is with much hesitation that any physiological argument is adduced but the relation between carbohydrate excess and anthocyanin production appears to rest on a sound experimental foundation.

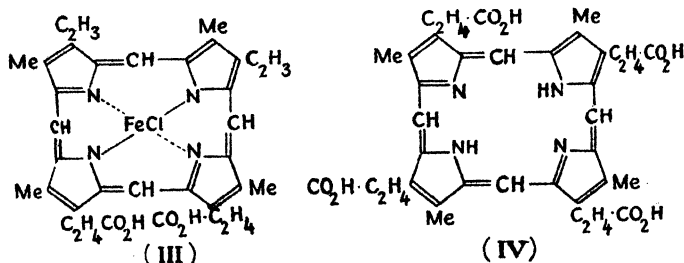
It is unlikely that aromatic nuclei are always produced directly from sugars

(or substances of inositol type). The possible function of polyacetic acids has already been mentioned and the simplest of these, acetoacetic acid, could easily yield orsellinic acid (II) by self-condensation.

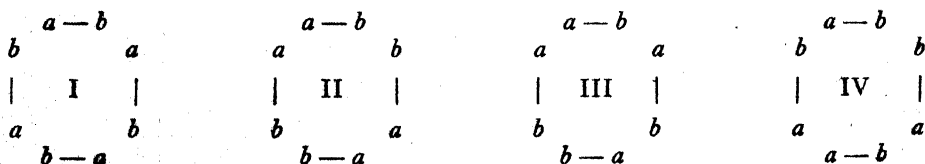


Here the significant coincidence is the occurrence of erythritol, $\text{CH}_2 \text{OH CH (OH) } \cdot \text{CH (OH) } \cdot \text{CH}_2 \cdot \text{OH}$, along with orsellinic acid, in lichen products. Erythrose could yield acetoacetic acid by dehydration, just as a hexose could afford tri-acetic acid (\longrightarrow phloroglucinol). It is not certain that this is the right way round but the structural relation is clear enough. The "other way round" might be that erythritol (or erythrose) is not the source of acetoacetic acid but is synthesised from it. On the whole a less attractive view, but by no means excluded on present information.

The Blood Pigment and its Relations. Two types of natural occurrence are known in this group and are represented by hæmin (III) and coproporphyrin-I (IV) respectively.



They are modified derivatives of the ætioporphyrins which are tetramethyltetraethylporphyrins in which each pyrrole nucleus bears one methyl and one ethyl group. If the methyl group is represented by a and the ethyl group (or that group in various modified forms) by b or *vice versa*, the following are the possible isomerides. It is assumed that the porphyrin ring is aromatic and tautomeric and does not exist in stable isomeric forms.



The four types of ætioporphyrins or coproporphyrins.

It will be seen that hæmin is related to ætioporphyrin-III whereas coproporphyrin-I is related to ætioporphyrin-I (there is also a natural coproporphyrin-III).

In ætioporphyrin-I the pyrrole nuclei are all similarly disposed whereas in the isomeride-III just one of the nuclei is turned round. This about-face of a nucleus in hæmin was a very surprising discovery. For our present purpose it exemplifies a type of argument which can be used to identify a structural unit. This can be recognised when it occurs intact in more than one form of combination. Thus the dissection $C_6(A)-C_3-C_6(B)$, already mentioned, receives support from the fact that the union of C_3 to $C_6(B)$ occurs in two different ways (isoflavone as well as flavone). In the present case the part which turns round must be a structural unit. This gives us a quite acceptable dissection into four pyrrole nuclei connected in the α -positions by four carbon atoms the sources of which are not indicated (glycine perhaps). The unions $C-ab$ and $C-ba$ will not be equally facile, and it makes no difference which we assume to be the more so. Let us select a, b such that $C-ab$ is the favoured combination.

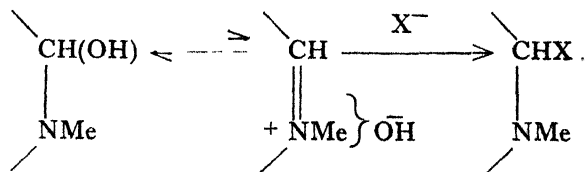
If we start with 4 $C-a-b$ then further condensation to a ring could only give type-I.

If we start with 2 $b-a-C-a-b$ further condensation would give type-II. Regular cyclic condensation gives type-III. Thus $b-a-C-a-b \rightarrow b-a-C-a-b-C-a-b \rightarrow b-a-C-a-b-C-a-b-C-a-b \rightarrow$ type-III. On the other hand a less regular cyclic condensation can give type-IV; $b-a-C-a-b-C-a-b$, as with type-III, may add a fourth group at the first section represented, giving $b-a-C-b-a-C-a-b-C-a-b$ and by cyclisation with the aid of the fourth C we get type-IV.

Thus the formation of type-I could be the result of an excess of the unit C component, whilst the absence of such an excess and the regular kind of cyclisation, $\alpha \rightarrow \beta \rightarrow \gamma \rightarrow \delta \rightarrow$ and $\delta \rightarrow \alpha$, provides the orientation of type-III.

Alkaloids. Because of their complexity the structures of the plant alkaloids are of peculiar interest in the present connexion. They have been related to various proteinogenous amino-acids which are often assumed to provide bases by decarboxylation, $R \cdot CH(NH_2)CO_2H \rightarrow R \cdot CH_2 \cdot NH_2$, and aldehydes by oxidation, $R \cdot CH(NH_2)CO_2H \rightarrow R \cdot CHO$. Once again the order of the stages of decarboxylation, etc., is not identifiable; for example, $R \cdot CO \cdot CO_2H$ may be the aldehyde equivalent, decarboxylation occurring later. As already stated the point at which O- and N-methylation occurs is also unknown.

An acceptable hypothesis is that the very facile condensation reactions of carbinol-amines and pseudo-bases play an important part in the elaboration of the complex structures. The typical case is illustrated by the scheme :—



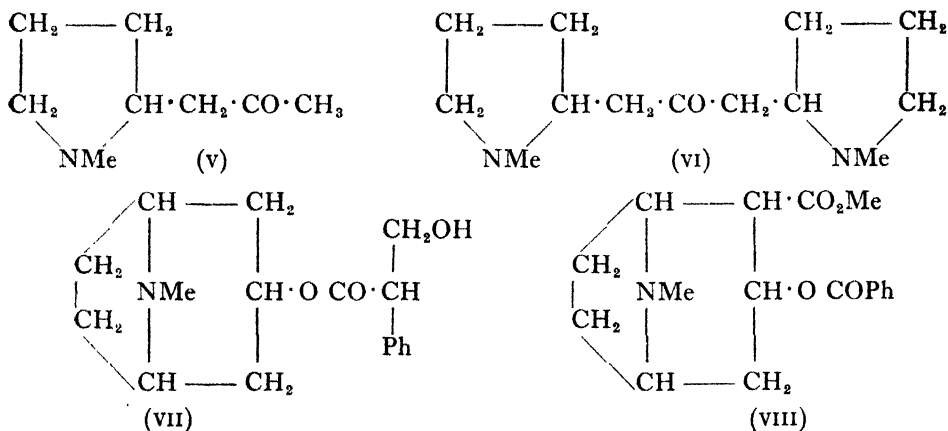
Where $X^- = ^-CN$, OR^- , $-CH^- (CO_2Et)_2$, $\cdot CH_2COR$, etc.

Condensations of carbinol-amines or pseudo-bases.

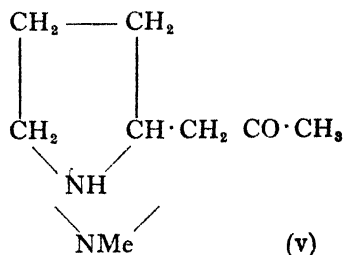
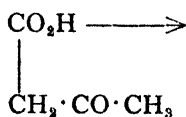
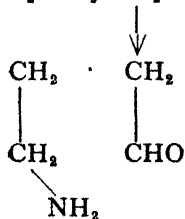
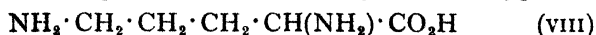
In the sections below the material is classified more or less in accordance with the amino-acids involved.

The ornithine or pyrrolidine group. This comprises a large number of alkaloids, many of which are found in solanaceous plants. As a connexion with ornithine, first postulated thirty years ago and now generally accepted, is assumed, it is interesting to note the occurrence of $\alpha\delta$ -tetramethyldiaminobutane, $\text{NMe}_2 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{NMe}_2$, among the *coca* bases. This is clearly derived from ornithine, $\text{NH}_2 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CH}_2 \cdot \text{CH}(\text{NH}_2) \cdot \text{CO}_2\text{H}$, by N-methylation and decarboxylation.

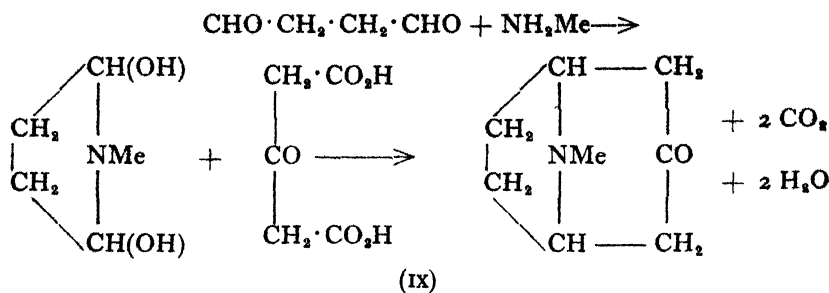
Loss of ammonia from ornithine affords proline, and the reverse change is another possible interpretation of the structural relation to the pyrrolidine series. Inspection of the constitutions of some of the well-known bases containing a pyrrolidine nucleus shows that it is combined with a C_3 group, which often looks like an acetone residue. This is most simply seen in hygrine (v) and the appearance of two pyrrolidine groups to one C_3 -unit in cuschygrine (vi) is very convincing. Atropine (viii) and cocaine (viii) contain the same units connected at two points.



A rough mechanism for the synthesis of hygrine is the following:—

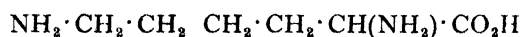


These ideas of psuedo-base condensations have been experimentally verified in several directions, the first of which was the synthesis of tropinone from succindi-aldehyde (a possible oxidation product of ornithine), methylamine, and acetone-dicarboxylic acid.

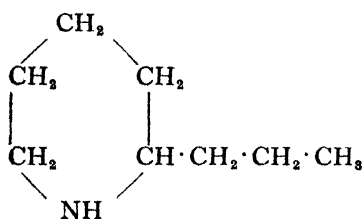


An even closer approach may be the synthesis in small yield of nortropinone by exposure of a mixture of $\alpha\delta$ -diamino-adipic acid and citric acid, neutralised in aqueous solution, to light and air over a long period.

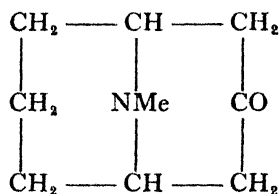
The lysine or piperidine group. The argument from the relations and syntheses in the pyrrolidine group is strengthened by the occurrence of homologous substances in Nature and by analogous syntheses. Thus lysine (x) provides a piperidine unit joined to a reduced C_3 -unit in coniine. The ketone exactly corresponding to hygrine is known as a minor alkaloid. Pseudopelletierine (xii) is the appropriate ring-homologue of tropinone.



(x)

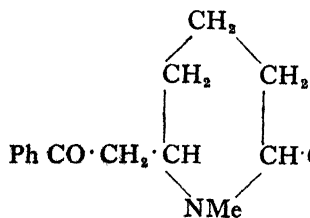


(xi)

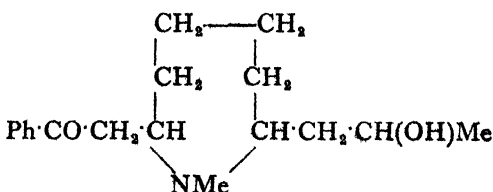


(xii)

The alkaloids of *Lobelia inflata* studied by Wieland and by Schöpf are of much interest because the side-chain is not always a C_3 acetone residue but may be an acetophenone residue. This is doubtless, C_6-C_3 , or $\text{Ph} \cdot \text{CO} \cdot \text{CH}_2 \cdot [\text{CO}_2] \text{H}$ in origin. Lobelanine (xiii) provides an argument like that from cuschygrine (above). In this case there are two side-chain units attached to one piperidine unit. Thus the dissection is confirmed by the occurrence of $\text{A}-\text{B}$, A_2B , and AB_2 .



(xiii)

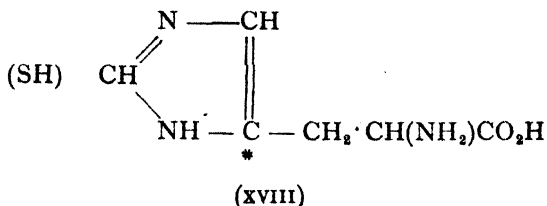
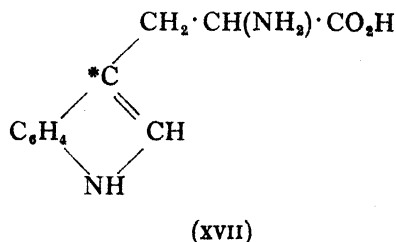
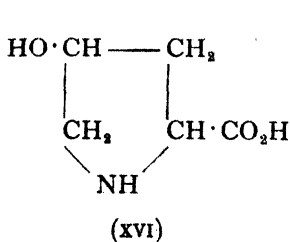
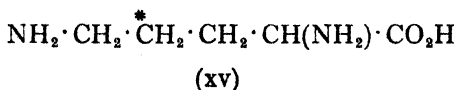


(xiv)

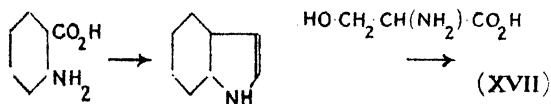
Lobelanine and pseudopelletierine are among the piperidine alkaloids that have been synthesised by simple pseudo-base condensations.

The constitution of lobinine is uncertain. The suggestion (xiv), at present before us, is unproven and a methylene group may perhaps be taken from the ring and inserted in a side-chain. The present theory strongly indicates this because a homologue of lysine has not been isolated and the other lobelia alkaloids are piperidine derivatives.

The tryptophan or indole group. Tryptophan (xvii) itself and histidine (xviii) have a close structural relation to ornithine or better, an oxidized progenitor of ornithine. Oxidation in the position bearing an asterisk (in xv) relates ornithine to hydroxyproline (xvi). A *-keto-ornithine could undergo Gabriels' synthesis to thiolhistidine, which occurs naturally, and union with C₆ would afford tryptophan.



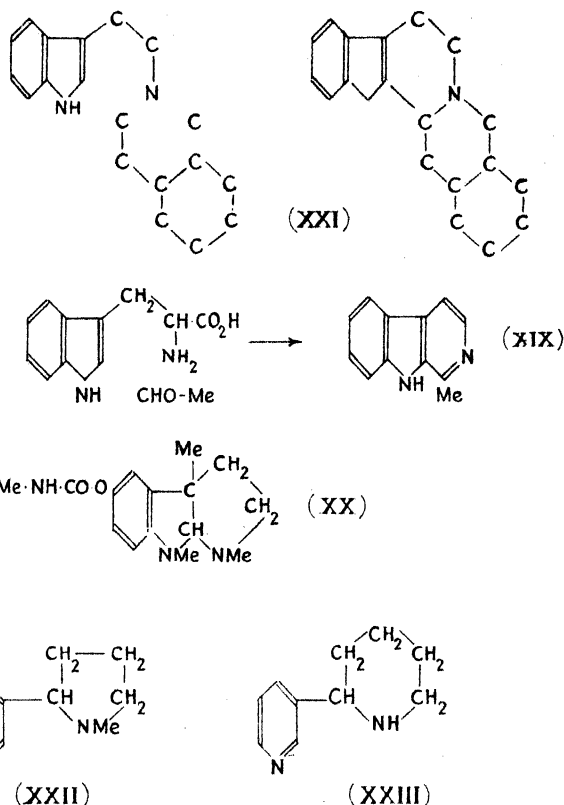
Although it has been shown that tryptophan is synthesised by certain bacteria as shown below from anthranilic acid, it is not quite certain that plants employ the same mechanism.



The alkaloids clearly related to tryptophan are now a numerous family and it may be said that in no other group have the biogenetic principles been more fruitful as guides in the determination of structure.

Harman (*syn.* aribine, loturine) (xix) can be synthesised by the joint oxidation of alanine (or other source of acetaldehyde) and tryptophan. Harmine and harmaline are closely related substances, and such carboline derivatives are widely distributed.

The structure of physostigmine (xx) was suggested by the lecturer on biogenetic grounds; it contains the C-methylated system to which reference has already been made. Barger (Madrid, 1934) drew attention to the relation of the yohimbine skeleton (xxi, to which CO_2H must be added) to tryptophan and substituted phenylalanine, an idea capable of considerable elaboration.

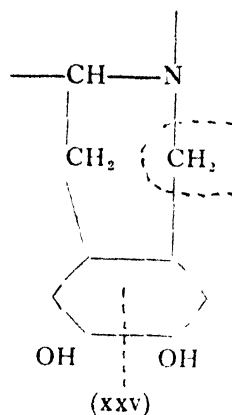
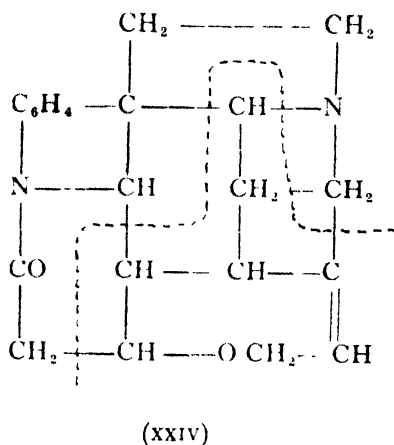


Some miscellaneous alkaloids of mixed origin. Examples of mixed amino-acid origin have already been mentioned, e.g. yohimbine.

Nicotine (xxii) may be a combination of piperidine and pyrrolidine types but it could also be related to hygrine by condensation with 2 CH_2O and NH_3 . Anabasine (xxiii) is ring-homologous in the sense already discussed. These bases are not really complex enough to give reliable indications. After all, the heterocyclic ring will usually be 5- or 6-membered and therefore *ipso facto* referable to ornithine or lysine. We require more than this to establish our requisite "degree of coincidence". Nevertheless it is worthy of note that the groups $\text{C}_4 \cdot \text{N} \cdot \text{C}_4$ (retronecine), $\text{C}_5 \cdot \text{N} \cdot \text{C}_5$ (lupinine and sparteine) are of very frequent occurrence and not necessarily in the form of the pyrrolidine or piperidine rings.

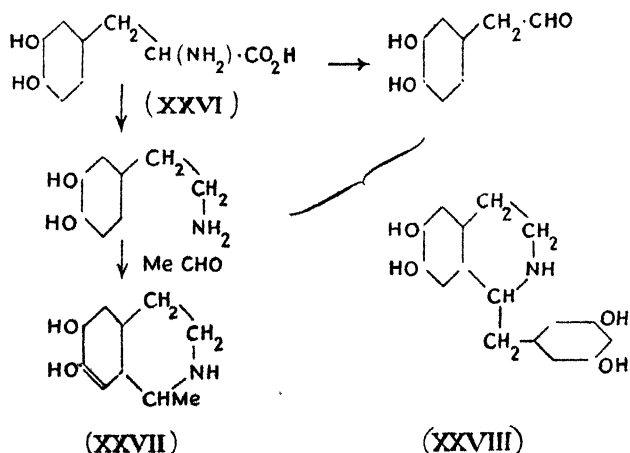
Strychnine and emetine (this section has been added *post-lecture*). The constitution of strychnine (xxiv) is now established, especially by the proof of the relations of vomicine to strychnine and by the synthesis of vomipyrine; also by the X-ray analysis made by Bijvoet in Utrecht. It should be briefly mentioned here that

Woodward has made an ingenious suggestion regarding the biogenesis of this structure. He relates it to tryptophan and dihydroxyphenylalanine. The latter furnishes the usual phenylacetaldehyde which attacks the β -indole position. Other changes supervene but the most important is the fission of the phenolic nucleus to give two chains which undergo further transformations. The part-formula (xxv) exhibits the benzene nucleus supposed to split in this remarkable process.



The writer expressed approval of this idea on the usual grounds of the improbability that the coincidence could be accidental. He then applied it to the case of three dihydroxyphenylalanine molecules (and a formaldehyde equivalent) and deduced a preferred constitution for emetine. This was later found to be in agreement with very recently disclosed experiments on emetine degradations (cf. *Nature*, 162, 523, 1948). It was a dramatic confirmation of the validity of the theory adumbrated by Woodward.

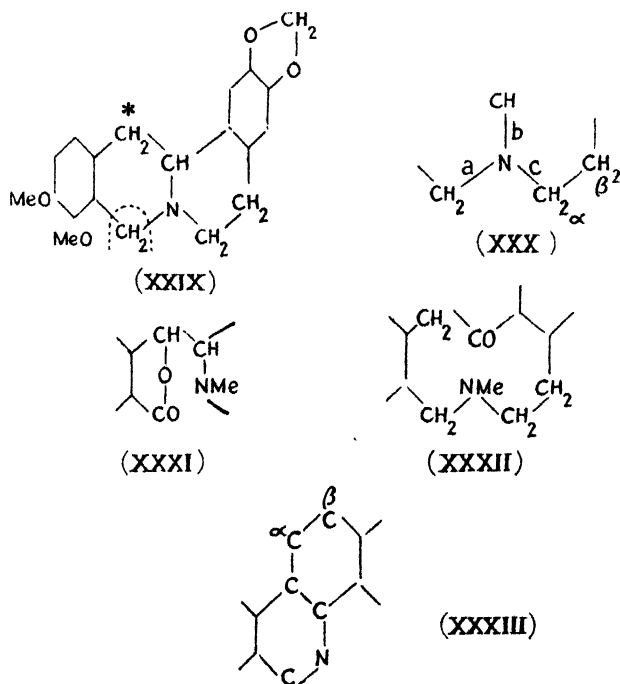
Apart from the new idea of fission of a benzene ring, these views are similar to others discussed in this lecture.



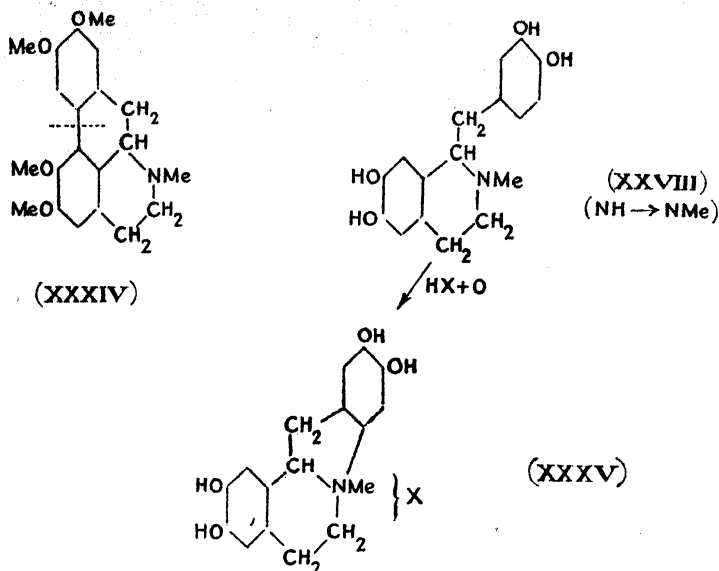
The phenylalanine or isoquinoline groups. The general idea in this series has already been made use of above and is illustrated in the synthesis of nor-salsoline (xxvii) from dihydroxyphenylalanine (xxvi) and by the elaboration of nor-laundanosine (xxviii) from two molecules of this amino-acid. The latter illustrates the classical Winterstein-Trier hypothesis (1910), which is so well known and generally accepted that advocacy seems unnecessary.

The subsequent modifications of nor-laundanosine are conversion to papaverine, laudanosine, etc. by various combinations of N- and O-methylation, 2 OH-methylenation, oxidation and reduction.

Condensation with the formaldehyde equivalent (and some of the foregoing processes) gives berberine and its tetrahydro-derivative, canadine (xxix). In the part skeleton (xxx) of the latter, C-methylation at the asterisked carbon atom (of $N \cdot C = C$) leads to corydaline; oxidation and N-methylation at (a) gives the lactone structure of hydrastine (xxxi); the same at (b) gives the protopine structure (xxxii). Fission at (c) with rotation and reunion at * affords the sanguinarine-chelerythrine structure (xxxiii).



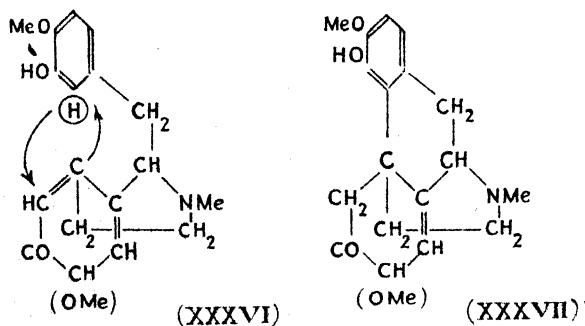
The aromatic phenanthrene sub-group is well represented by glaucine (xxxiv) which is simply dehydro-laundanosine. The attempt to realise the oxidative ring-closure with nor-laundanosine gave (xxxv) as was proved in two independent investigations.



Sinomenine. The biogenesis of this alkaloid (xxxvii) from a base of laudanosine type (xxxvi), which is written as a tautomer and in a very unusual arrangement is almost a self-evident proposition. It can hardly be doubted that this suggestion is correct in essentials.

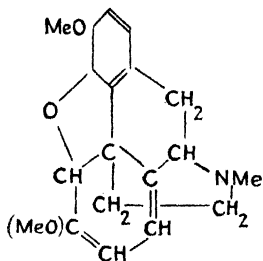
The base (xxxvi), hopefully termed protosinomenine, has been synthesised, but not in adequate quantity for a full study of its transformations.

Thebaine and other members of the morphine groups. A theory similar to that which has been suggested for sinomenine meets the difficulty that the orientation of hydroxyl groups required of the laudanosine-like intermediate is unusual. It is suggested that the origin may be from tyrosine by way of (xxxix). The usual condensation of the phenylacetaldehyde and phenylethylamine is here assumed to have occurred *p*- to phenolic hydroxyl. The resulting quinol can now suffer a migration of the side-chain to the nucleus. Oxidation, dehydration, methylation, and ring-coupling can then give thebaine (xxxviii). The peculiar and important bis-nor-laudanosine series, of which oxyacanthine (xl) is an example, affords some help in regard to the nuclear oxidations required for the above hypothesis. The formation of such diphenyl ethers is clearly an oxidative process; it can of course be imitated in the laboratory in various ways with much simpler substances.

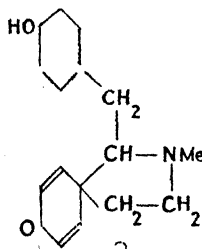


In fact none of the suggested transformations of tyrosine is without analogy. The oxidation to dihydroxyphenylalanine is established *in vivo*. Oxidation at position-1 leads in homogentisinuria to migration of the side-chain to an *o*-position and to formation of homogentisic acid. Similarly, with extrusion of the side-chain, such oxidation is involved in the formation of thyroxine (a diphenyl ether) from tyrosine (Harington).

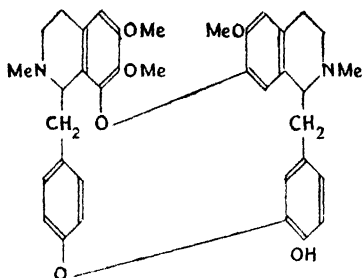
The lecturer has already pointed out that the ring system of steroids can be dissected into two identical skeletal halves. These have the appearance of a tyrosine



(XXXVIII)



(XXXIX)



(XL)

methylated on position-1 (compare physostigmine, corydaline) and with the side-chain transferred to an *o*-position.

The subject is far from exhausted by these few examples, but perhaps enough has been said to indicate the scope and the limitations of this method of investigation.

DISCUSSION

THE CHAIRMAN: We have to thank Sir Robert very heartily indeed for the lecture, he has given us to-day, of extraordinary depth and interest. It is not our practice at the Trueman Wood lectures to invite questions or discussion, and I am, therefore, going to follow precedent strictly, only saying this, that if I did not understand all the lecture and if it were the custom for the Lecturer to examine the Chairman afterwards on what had been said, I should have to plead for an "aegrotat". I did try to prepare beforehand for this meeting, but could think of no better preparation than by visiting the Atomic Train at Paddington yesterday!

And now will you all please join me in according to Sir Robert a very hearty vote of thanks for his admirable lecture?

The vote of thanks was carried with acclamation.

GENERAL NOTES

THE DEVONSHIRE COLLECTION.—Fifty-five selected masterpieces (whose value, I am told, is not less than half a million pounds) from the Chatsworth collection amassed by the Earls and Dukes of Devonshire, have been assembled at Agnew's, 43 Old Bond Street, to mark the centenary of the Fitzwilliam Museum at Cambridge. Such information as can be gleaned from the family archives about the history and attributions of the pictures is given in the catalogue; and it must suffice to say here that the famous collection founded by Sir William Cavendish, and enriched by the addition of the Burlington Collection in 1748, has been carefully preserved to judge by the canvases at Agnew's, all of which are in good condition and several evidently only lately cleaned.

Faced with a collection of pictures drawn from the English, French, Dutch, Flemish and Italian schools, extending over nearly four centuries, and as dazzling to the eye as an anthology culled from the Royal Collection (with which it may justly be compared), the most one can do is to single out a few precious works without attempting to relate them. The places of honour at the end of the first-floor room is rightly given to Holbein's full-scale cartoon of Henry VII and Henry VIII, a superbly detailed drawing transferred line by line to a wall of Whitehall Palace for a painting long since destroyed by fire. No less precious an example of its kind is Hans Memling's *Donne triptych*, as exquisite a piece of Flemish realism as any you will find by this Primitive in Bruges, and valuable not least for the glimpse it affords us of the artist in the left panel.

Rembrandt is nobly represented by "A Rabbi", painted with mature assurance before the age of thirty; and on the right of this canvas an enchanting Claude, "Mercury and Bacchus", is matched on the opposite wall by his contemporary Poussin's "Holy Family", to my mind an even lovelier work than this artist's more celebrated "Et in Arcadia Ego" which hangs nearby. But to enumerate a catalogue—even if it be a roll-call of the most illustrious names in the history of Art—makes tiresome reading; and I shall only beg intending visitors, after they have admired the imperious portraiture of Van Dyck, the bravado of Hals, and the melting beauty of Gainsborough, not to overlook Boltraffio's portrait of a young poet, a supreme expression of the Renaissance Art in Italy.

150 YEARS OF LITHOGRAPHY.—It was, we are told, in jotting down a laundry list on a slab of stone that Aloys Senefelder discovered the principle of Lithography—of printing, that is to say, from a greasy impression drawn on a specially prepared stone surface. The immediate result of Senefelder's invention in 1798 was a series of "Polyantographs" (mostly pen-and-ink drawings done on stone) made by such leading artists as William Blake, Henry Fuseli, and Benjamin West; but two decades were to elapse before the potentialities of the medium began to be fully explored, and from about 1820 onwards—as we see in the notable exhibition of "150 Years of Lithography" at the Victoria and Albert—lithography usurped the position of the aquatint as the appropriate medium for topographical prints.

During the first half of the century there were several fascinating developments of the medium. Lithographs coloured by hand enjoyed a brief popularity; and one of the most exquisite prints in the exhibition is a delicately limned "Owl", done possibly for his patron Lord Derby by Edward Lear in 1832. Lithotints by Clarkson Stanfield, Cattermole and others had a vogue during the '40s, and were succeeded by lithographs printed from several stones in the '50s (such as "Souvenirs of the Great Exhibition", printed from five stones in 1851) and in turn by the opaque chromo-lithographs of the following decade. Meanwhile, in France, Gavarni had carried the medium a stage further than his great predecessor Ingres' drawings on stone; and interest in this most sensitive art was revived at the end of the century with the prints of the French Impressionists, notably Camille Pissaro, Sisley and Toulouse-Lautrec.

In this country Whistler was active, but the medium languished after his death, and

it is to the enterprise of a group of our younger artists that the remarkable revival of lithographic book-illustration is largely due. Those Fellows who can spare time to visit the Victoria and Albert before the end of the year will, I think, agree with me that Barnett Freedman, Lynton Lamb, Edward Bawden and Edward Ardizzone worthily maintain their place in a great tradition.

N. A. D. W.

EXHIBITION OF LEATHERCRAFT, ANCIENT AND MODERN.—In a recent series of papers read before this Society attention was focused on the importance of preserving the elements of craftsmanship at a time when it appears to many that this machine-age has given the *coup de grace* to the craftsman. The exhibition of Leathercraft, Ancient and Modern, held at the College for the Distributive Trades, Charing Cross Road, London, from the 22nd to 30th October, provided what must have been for many a surprising and fascinating survey of the use of leather over many centuries, and included many examples of superb craftsmanship with which comparatively few must be acquainted. From flint eoliths believed to be skin scrapers to a charming leather air-travel bag or a dainty hand-bag of the present-day covers a long period of history, but, in spite of the limitations of space, the organisers succeeded in bringing together a variety of leather articles whose use reflected not only many different ages but widely differing everyday needs of all classes which were successfully met by the leather craftsman, both in Britain and elsewhere. Six main classifications, Leather in the Personal Sphere, in Social Life, in Trade and Commerce, in Learning, in Travel and the Active Life, provided an opportunity not only for variety of product, but also for emphasising the versatility of leather and its importance to man's development.

The medieval articles of *cuir bouilli*, which the compilers of the catalogue claim is not the mystery it is often claimed to be but is still practised to-day, provided some outstanding examples of virtuosity not only in the provision of such everyday things as bombards and black-jacks, but also in the magnificently decorated shields, quivers, girdle-containers, coffers and many other things which provided so interesting a part of the exhibition. Bookbinding was represented by a small but choice collection of fine bindings, leather clothing by pierced jerkins, shoes from Roman times onwards, buff leather coats and tunics capable of warding off a sword thrust and an Elizabethan one with slashes revealing salmon-colour silk. The importance of leather to the traveller throughout the ages was represented by a fine collection of leather-covered coffers of many types and sizes. The superb craft of the saddler and harness maker was worthily displayed in magnificent examples from the Royal Mews, lent by gracious permission of H.M. The King, together with a rare example of a pillion and modern examples which proved, in spite of the lack of elaborate ornamentation, how well this skill has been preserved to the present day. A small number of contemporary articles—beauty boxes, manicure cases, handbags, light-weight and wardrobe hand luggage, footwear and gloves, compared favourably with the ancient examples, even if such *tours de force* as the Victorian lady's boot stitched sixty to the inch or the black harness beautifully decorated with goose-quill stitching are no longer made.

The exhibition was organised by Dr. C. H. Spiers and Mr. J. W. Waterer for the Education Committee of the National Leather Goods and Saddlery Manufacturers' Association, whose enterprise in bringing together for the first time so representative a collection of leathercraft is to be highly commended. Congratulations are also due to the staff and students of the College for the Distributive Trades for the excellent display. The purposes of the exhibition were to provide stimulating examples of craftsmanship (and it is encouraging to know that many schools and training centres sent groups of students), and to stimulate interest in a scheme to set up in due course a National Museum of Leathercraft. About one-third of the exhibits comprised articles already acquired for this purpose; to this nucleus were added examples lent by the Victoria and Albert Museum, the London Museum, the Guildhall Museum, private collectors and dealers, in addition to the Royal loan already mentioned. Here is an example which other industries could usefully follow.

NOTES ON BOOKS

RUSSIAN ART—FROM SCYTHS TO SOVIETS. By Cyril G. E. Bunt. The Studio Ltd. 21s.

Probably to most people in this country the arts of Russia are almost as remote and inscrutable as the enigmatic minds in the Kremlin. During the past fifty years barely half a dozen reliable books on the Russian arts have been published in English; and the exhibition of Soviet graphic art at Burlington House in 1945 only served to whet our appetite for a comprehensive display of Russian arts and crafts which, in present circumstances, can hardly be envisaged. Our knowledge of the Russian school has therefore had to be gleaned from a few permanent collections in London and, so far as modern painting is concerned, from Loukomski's pessimistic survey which gave some disquieting evidence of the deterioration of national art dictated by a totalitarian state.

It follows that Mr. Bunt's copiously illustrated survey of the Russian arts from the immediately pre-Christian era to the present day is a timely study, and a valuable addition to the Society's Library. Written against a background of history, it traces lucidly and authoritatively the development of architecture, sculpture, painting, ceramics, metalwork, and the peasant crafts. Throughout the centuries we observe the successive influences of foreign artists, the Mongol incursion in the thirteenth century imparting the semi-oriental splendour to the arts of Russia which they ever afterwards displayed. Yet, as the author points out, until the close of the seventeenth century "practically all the arts of Russia were entirely subservient to the Orthodox faith", and in the various schools of icon painting the Russian spirit achieves coherency.

This volume takes its place as a standard work in the history of European art.

N. A. D. WALLIS.

LIBRARY ACCESSIONS DURING OCTOBER, 1948

Lists of accessions to the Library will be published in the *Journal* at regular monthly intervals. Items marked with an asterisk are for reference purposes and cannot normally be borrowed.

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Autobiography. Jonathan Cape, 1945.

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MAIRET (ETHEL).

Hand-weaving to-day. Faber, 1939.

*NATIONAL TRUST.

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Life and work of Humphrey Gainsborough, 1748-76. Henley, 1948. (Presented by the Author.)

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Drawings by European Masters. Batsford, 1948.

Roger van der Weyden, paintings, etc. Batsford, 1947.

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Modern arboretum. Massachusetts, 1948.

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Second World War. Vol. I. The gathering storm. Cassell, 1948.

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London: the unique city. New edition. Jonathan Cape, 1948.

RICKETT (H. W.).

Royal Botanical Expedition to New Spain, 1798-1820. Massachusetts, 1947.

SCHOLTS (FRANK A.).

The great Dr. Burney. 2 vols. O.U.P., 1948.

SINGAPORE IMPROVEMENT TRUST, 1927-1947.

Singapore [1948]. (Presented by the Trust.)

SOME MEETINGS OF OTHER SOCIETIES DURING THE ENSUING FORTNIGHT

MONDAY, NOVEMBER 8. Geographical Society, Royal, S.W.7. Professor G. H. J. Daysh, "Development Areas and the Location of Industry." Purchasing Officers Association, at the Royal Society of Arts, W.C.2. 6.30 p.m. Film—"Steelmaking."

TUESDAY, NOVEMBER 9. Chemical Industry, Society of, Geological Society, W.I. 5.30 p.m. A. D. Davidson, "Heat Transfer." Illuminating Engineering Society, 32 Victoria Street, S.W.1. 6 p.m. Dr. J. W. Mitchell, "High Speed Photography." Mechanical Engineers, Institution of, S.W.1. 6 p.m. S. W. Marsh, "Rubber as a Stress-Carrying Material." Physics, Institute of, 47 Belgrave Square, S.W.1. 5.30 p.m. P. H. Flanders, "The Physical Properties of very High Voltage X-rays and Electrons and their Medical Interest."

WEDNESDAY, NOVEMBER 10. Electrical Engineers, Institution of, W.C.2. 5.30 p.m. H. M. Lacy, "The Lightning Protection of High-Voltage Transmission and Distribution Systems." Petroleum, Institute of, at Manson House, W.1. 5.30 p.m. F. H. Garner, "Detergency of Carbon Black in Hydrocarbon Solution." Sanitary Institute Royal, S.W.1. E. H. Callow, "Science in the Imported Meat Industry."

THURSDAY, NOVEMBER 11. Chemical Society, W.I. 7 p.m. Professor C. E. H. Bawn, "The Structure and Reactivity of Free Radicals." Electrical Engineers, Institution of, W.C.2. 5.30 p.m. T. P. Wakelord, "Waterworks Power Plant Practice." Metals, Institute of, at the Royal School of Mines, S.W.7. 7 p.m. Professor W. R. Jones, "Resources of Strategic Metals."

Royal Society, W.I. 4.30 p.m. (1) R. M. Goody, "The Thermal Equilibrium at the Tropopause and the Temperature of the Lower Stratosphere." (2) S. Chapman and K. K. Tschu, "The Lunar Atmospheric Tide at 27 Stations widely distributed over the Globe."

FRIDAY, NOVEMBER 12. Mechanical Engineers, Institution of, S.W.1. 6 p.m. I. M. Davidson, "Compression Shock as in Turbine and Compressor Blade Passages." Royal Institution, W.I. 9 p.m. Dr. Herbert S. Agar, "The Unwritten Constitution in America."

TUESDAY, NOVEMBER 16. Chemical Engineers, Institution of, at the Geological Society, W.I. 5.30 p.m. J. Matthews, "Chemical Plant Design for Ease of Cleaning."

WEDNESDAY, NOVEMBER 17. Meteorological Society, Royal, S.W.7. 5 p.m. F. H. Ludlam, "The Physics of Clouds."

Microscopical Society, Royal, W.C.1. 5.30 p.m. Dr. A. F. W. Hughes, "The R.M.S. Film Library." Regent Advertising Club, at the Livingstone Hall, Broadway, S.W.1. 6.30 p.m. The Rt. Rev. and Rt. Hon. J. W. C. Wand, "Can Publicity fill Empty Churches."

THURSDAY, NOVEMBER 18. Road Transport Engineers, Institute of, at the Royal Society of Arts, W.C.2. 6.30 p.m. R. B. Daniell, "The Psychology of Diagnosis."

Royal Society, W.I. 4.30 p.m. H. R. Marston, "The Nutrition Laboratories of Australian Council for Scientific and Industrial Research, Adelaide."

FRIDAY, NOVEMBER 19. Chemical Engineers, Institution of, at the University, Birmingham. 4.30 p.m. Professor F. H. Garner, "Extractive Distillation." Mechanical Engineers, Institution of, S.W.1. 6 p.m. K. Baumann, "Heat Engines." Physics, Institute of, at the University, Manchester. 7 p.m. Dr. A. B. D. Cassie, "Physics in the Wool Industry." Royal Institution, W.I. 9 p.m. Professor F. E. Simon, "Power Sources and Power Utilization."

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